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Climatic Degree Days for Energy Demand Assessment

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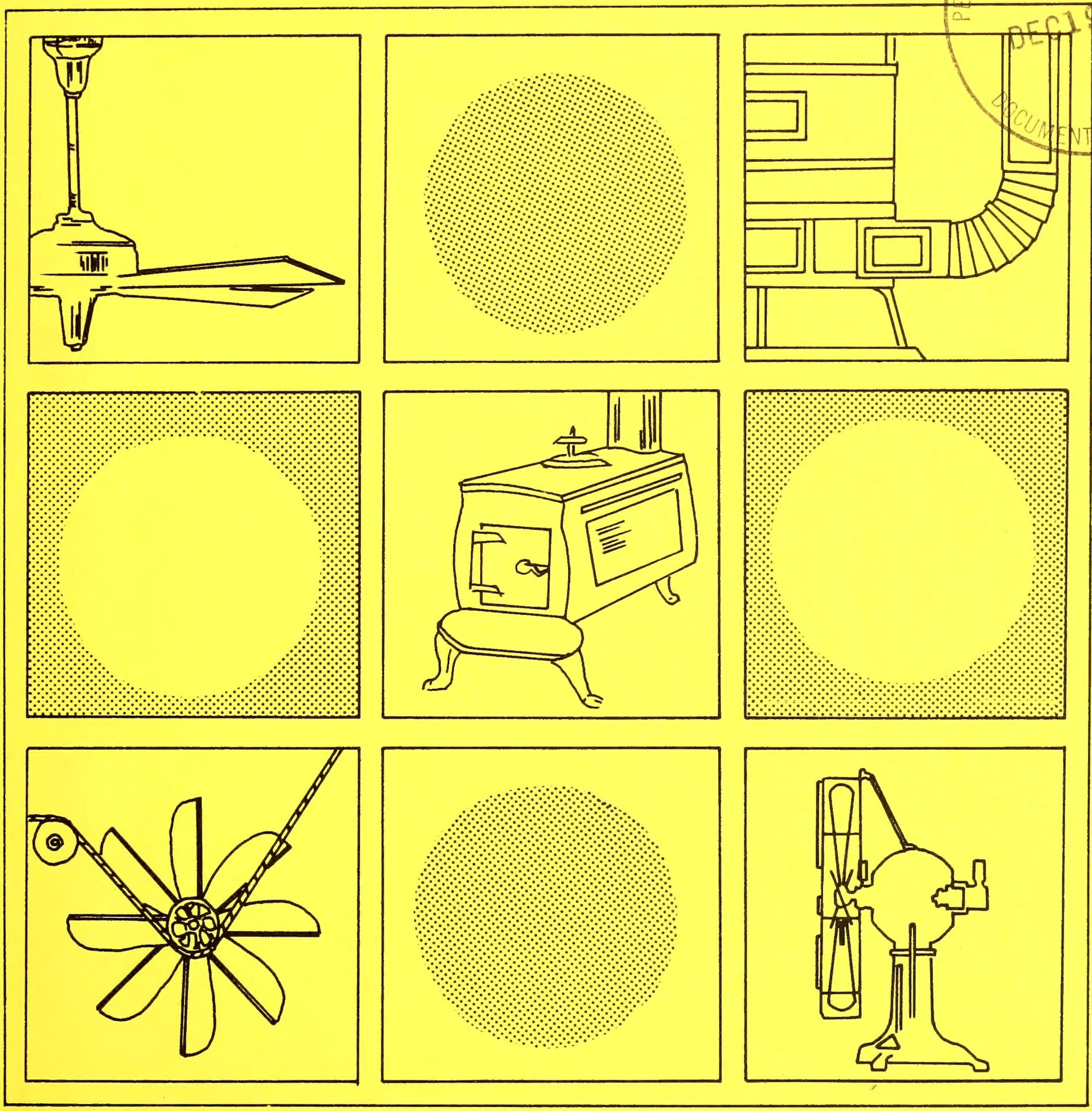

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Climatic Degree Days for Energy Demand Assessment

Henry E. Warren, Economist;
Sharon K. LeDuc, Senior Statistician;
Mary S. Joshua, Computer Programmer
Center for Environmental Assessment Services (CEAS),
CIAD/Models Branch,
Columbia, Mo.

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U.S. DEPARTMENT OF COMMERCE
Philip M. Klutznick, Secretary

National Oceanic and Atmospheric Administration
Richard A. Frank, Administrator

Environmental Data and Information Service
Thomas D. Potter, Director

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ABSTRACT

This publication presents the development and procedures for the use of real-time heating and cooling degree days information for States. These State data are determined by population weighting heating and cooling degree days data from major National Weather Service stations. The concept of a degree day index is a result of the need to monitor temperature sensitive energy consumption on a disaggregated basis. Climatological normals and ranges of heating and cooling degree days are calculated for each State and presented in tabular and graphical form to facilitate the use of operational information.

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Introduction

This publication describes products which fill information needs of energy planners and policy makers at the State and national level in the public and private sectors. These products were developed by two agencies of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration: the Climate Analysis Center of the National Weather Service (NWS-CAC) and the Climatic Impact Assessment Division of the Environmental Data and Information Service's Center for Environmental Assessment Services (EDIS-CEAS). The increasing scarcity and price of natural gas, heating oil, electricity, and other energy sources used for space heating makes it crucial to closely monitor energy requirements for space heating during the winter.

The first product developed to aid in monitoring energy requirements was the weekly State heating degree day summary and forecast which was initiated by the CAC in the fall of 1975. Concurrently, the CEAS-Climatic Impact Assessment Division developed and designed the cumulative State heating degree day graphs and tables to provide statistical interpretation of successive heating degree day accumulations during the winter. In addition, for a few States, relationships were derived to relate weekly heating degree day numbers to natural gas consumption in the State[1].

The heating degree day (HHD) was developed by heating engineers in the 1920's as a measure of energy requirements for space heating. It was subsequently adopted as a cumulative index of cold weather and energy requirements for space heating. In the 1960's, when electrical air conditioning came into wide use in homes and offices, an index of warm weather was needed that would indicate the amount of energy consumed for air conditioning, and the cooling degree day (CCD) was developed[2].

The heating degree day was originally derived with the base 65°F and, for consistency and symmetry, the cooling degree day base was also chosen at 65°F; (See appendix I). There has been some investigation and discussion as to whether heating and cooling degree days based on 65°F are an adequate and accurate index of energy use for space heating and cooling with current improved construction and insulation standards. The base 65°F may be too high for heating degree days and cooling degree days. Cross-sectional comparisons of degree days may not directly reflect energy requirements between different areas due to differences in climate and construction methods.

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[1] See Warren, H.E., "A Regression Model for Estimating Weekly Natural Gas Sendout in the State of Missouri," USDOC, NOAA, EDIS, CCEA Technical Note 76-9 Columbia, MO, June 1976. Also see Lehman, R.L., and H.E. Warren, "Residential Natural Gas Consumption: Evidence That Conservation Efforts Have Failed," *Science*, Vol. 199: 879-882, February 1978.

[2] A catalogue of information available on degree days from the National Climatic Center and other sources is *Heating and Cooling Degree Day Data*, U.S. Dept. of Commerce, Nat. Oceanic and Atmos. Adm., Env. Data and Info. Div., "Environmental Information Summaries C-14," National Climatic Center, Asheville, N.C., April 1978.

It is important to note that station weighted State degree days are a set of unique values that do not necessarily correspond to the State heating and cooling degree days published by the NOAA/EDIS National Climatic Center. The latter are based on the climatic division degree days from about 7,000 stations across the Nation which are calculated after the CAC statistics have been published (1, 2). Although both the station weighted State degree days are the climatic division weighted State degree days are calculated through population weighting, the difference in the number and location of the stations makes the two sets significantly different in several States. Each set works equally well in indicating the relative energy consumption for space heating. However, the operational values of the station weighted state heating degree days cannot be compared to either the climatic division weighted State degree day normal or values for previous years. Unless otherwise noted in this publication, "State heating degree days" and "State cooling degree days" will refer to station weighted heating and cooling degree days; the term "degree day(s)" will be used for brevity[3,4].

Development and Design of the Degree Day Graphs and Tables

The degee day graphs and tables were produced from historical normals of the stations used to calculate the operational State degree day values. The 204 major weather stations selected for calculating operational State degree day values were chosen by the CAC on the basis of consistent and reliable reporting. Given this set of stations, the Climate Analysis Division of the EDIS National Climatic Center selected stations in and around each State and partitioned the State along county boundaries such that the counties would be allocated among the available stations with climatic similarities. The boundaries were drawn along county lines so that the population in the area to be associated with each station could easily be determined. The results of this proccedure for the State of Indiana are presented in figure 1; note that these areas are not the same as the climatic divisions of the State. As can be seen, the weight a station receives in the calculation of the State degree days is determined by the proportion of the population in the area of the State associated with the station. It can also be seen that stations near State borders that are climatically representative of large areas may be used in the calculations of degree days in adjoining States. For example, referring to figure 1, the counties in the

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[3] Nall, Daniel and Edward Arens, "The Influence of Degree Day Base Temperature on Building Energy Prediction," National Bureau of Standards Washington, D.C., Presented at January 1979 ASHRAE Weather Data Symposium.

[4] For other weighting processes and additional information see Mitchell J.M., R.E. Felch, D.E. Gilman, F.T. Quinlan, R.M. Rotty, "Variability of Seasonal Total Heating Fuel Demand in the U.S.," Special Task Group, USDOC, NOAA, Washington, D.C., September, 1973.

Figure 1. - Indiana weather stations, associated areas, population, and weights for calculating station weighted State degree days.

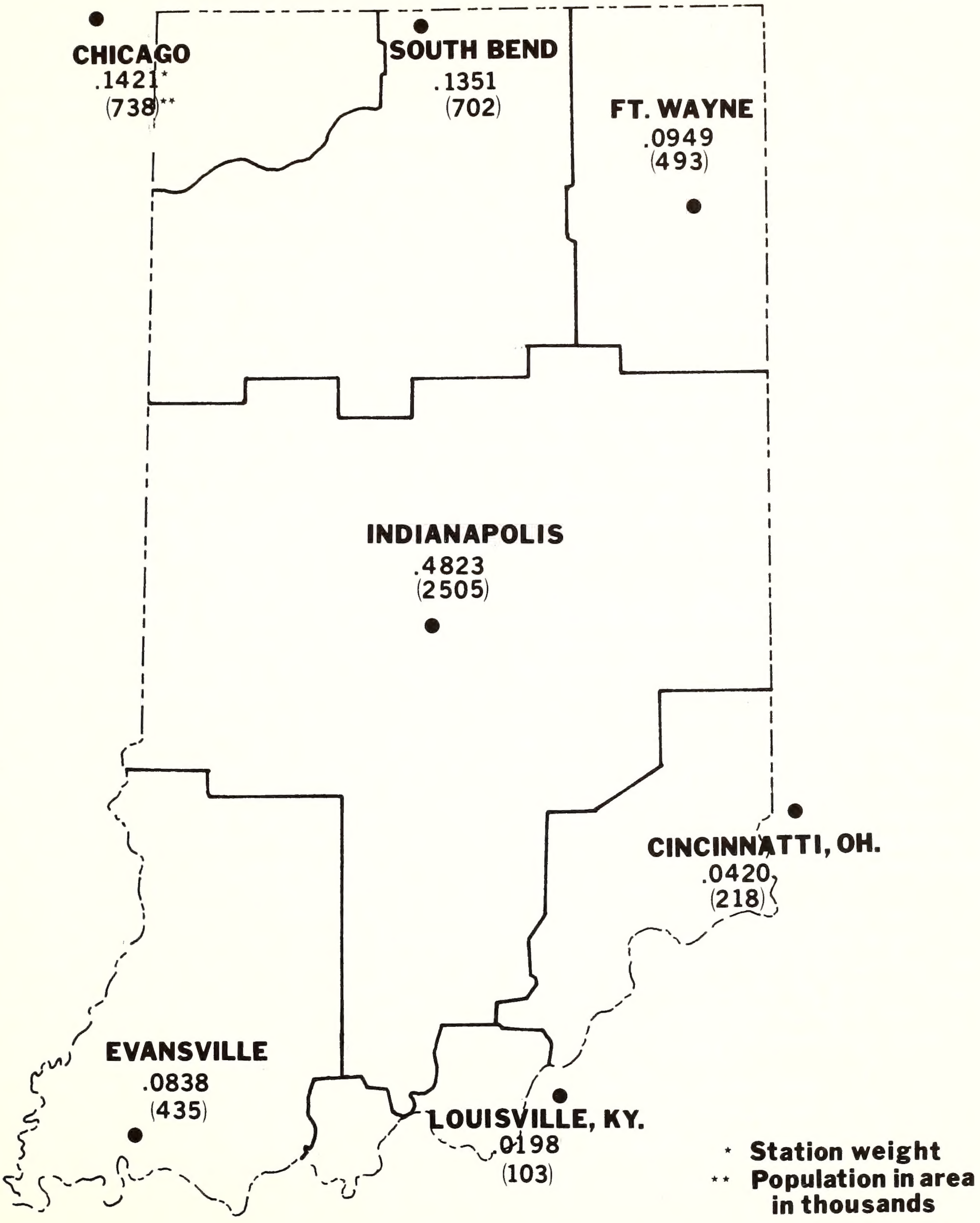
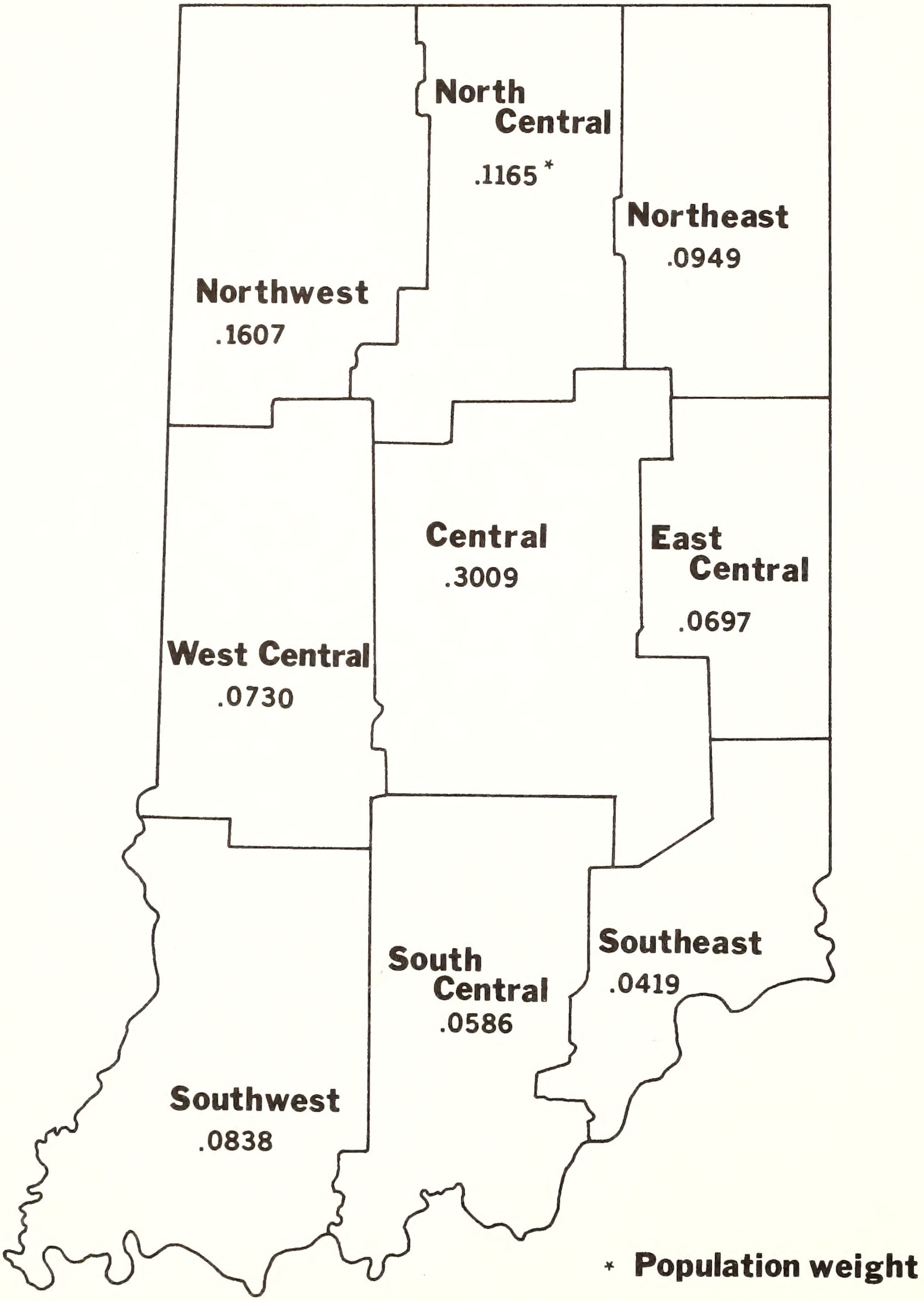


Figure 2. - Indiana Climatic Divisions



northwestern corner of Indiana are climatically similar to the weather station at Chicago (Midway Airport). The population in those counties is 738,000. The total population of Indiana is 5,194,000. Thus, the weight that Chicago receives in the calculation of the degree days for Indiana is

$$\frac{738,000}{5,194,000} = 0.1421.$$

The station weighted State heating degree days are calculated for any period of time by summing products of the station weight times the degree days at the station for that period. Indiana degree days = (.1421 x Chicago degree days) + (.1351 x South Bend degree days) + (.0949 x Fort Wayne degree days) + (.4823 x Indianapolis degree days) + (.0838 x Evansville degree days) + (.0198 x Louisville degree days) + (.0420 x Cincinnati degree days).

The algebraic formulations that are used to calculate the degree day accumulations are presented in appendix 1. The graphs and tables of cumulative State degree days are designed to facilitate the use of operational weather information by providing a depiction of the accumulated severity of the current heating or cooling season. The normal State degree day accumulations are calculated by the same formula using the normals (1941-1970) for each of the stations and their associated weights. The normal heating degree day accumulation for Indiana is the middle curve presented in the graph in figure 3. The two curves symmetrical to the central curve are the upper and lower bounds of a 90 percent confidence interval around the curve. On any day during the year the accumulation of heating degree days should be contained between the two curves 9 years out of 10. The interval is symmetric so the chances of being above the upper or below the lower curve are each 5 percent. The statistical formulations that are used to calculate these bounds are presented in appendix 1.

In figure 3 the accumulation of heating degree days for the entire year (July 1 - June 30) is presented. The heating year was chosen as July 1 through June 30 of the following year so a single winter would be contained in the 12-month period. There is no significant accumulation of heating degree days in the United States before September 1 (day 63) or after May 31 (day 335). Consequently, in the graphs in appendix 2, only the portion of the curve between September 1 and May 31 is presented. Similarly, for State cooling degree days only the portion of the cooling degree day accumulation curve between May 1 and September 30 is depicted; the cooling year coincides with the calendar year. In figure 3 and the graphs in appendix 2 note that the numbers labeling the vertical axis, i.e., 80.00, 160.00..., 720.00, are scaled down by a factor of 10 and thus represent 800., 1600., ..., 7200. (In States where the upper bound of HDD approaches 10,000 the scale factor is 100).

In conjunction with each State's graph there is a table containing the numerical value of the points plotted on the graph of the normal, the upper bound, and the lower bound of cumulative degree day numbers for days during the heating season. The table also contains the standard deviation of normal cumulative degree days during the heating season. As is explained in appendix 1, the standard deviation is the parameter used to calculate the upper and lower bounds around the the normal.

Table 1 corresponds to the graph in figure 3 and contains normal values for the entire 1978-1979 heating season from the first week in July 1978 to the last week in June 1979. This is designed to correspond

Figure 3. - Indiana Cumulative Heating Degree Days x10^1

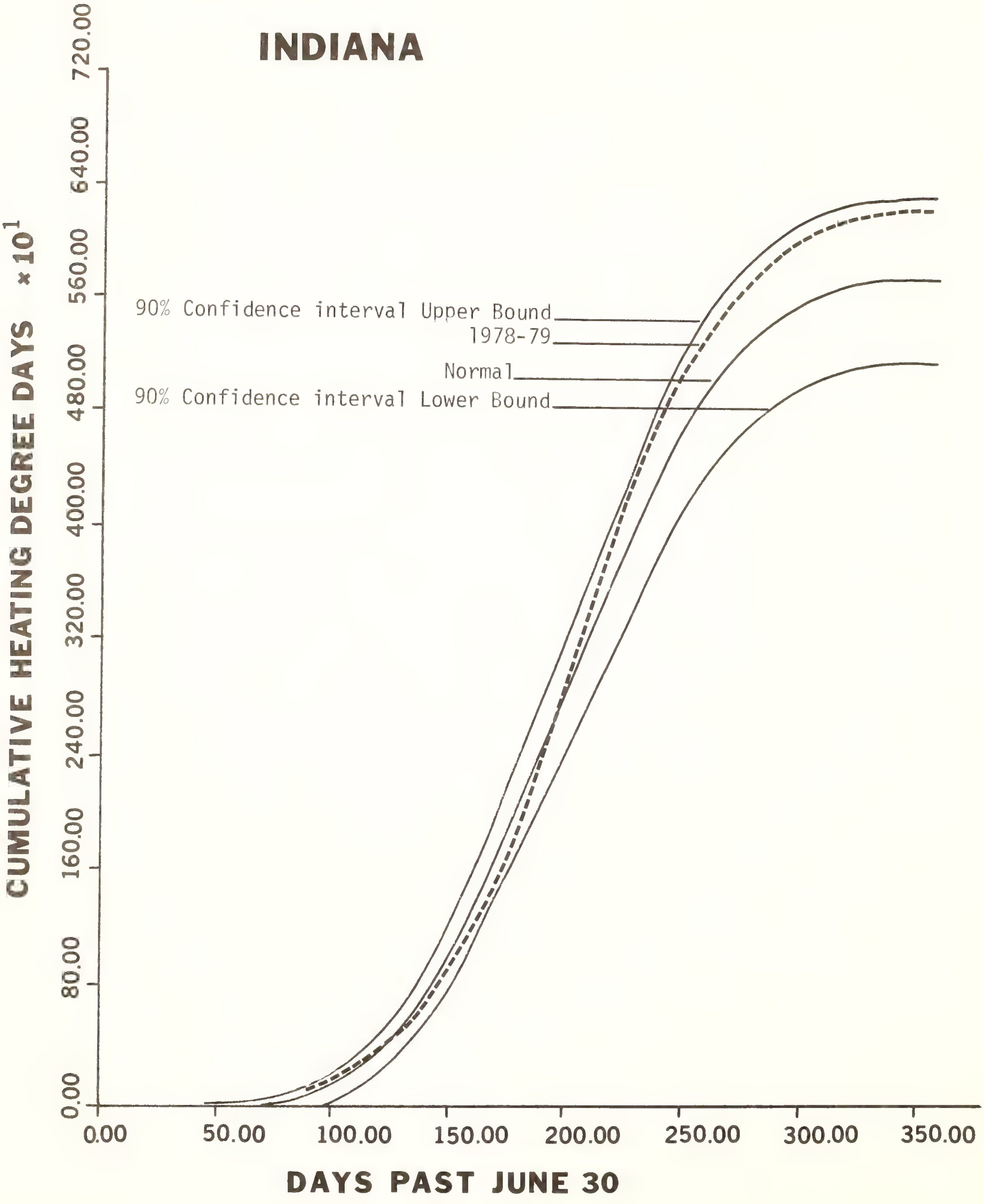


Table 1. - Indiana weekly normal accumulated heating degree days and 90% confidence interval

Days past June 30	Week ending	Lower bound	Normal	Upper bound	1978-79 Observations	St. dev.
9	7/9	0.0	0.0	2.25		1.37
16	7/16	0.0	0.0	3.00		2.43
23	7/23	0.0	0.0	5.72		3.49
30	7/30	0.0	0.0	7.48		4.56
37	8/6	0.0	1.00	10.71		5.92
44	8/20	0.0	2.00	14.04		7.34
51	8/20	0.0	3.00	17.35		8.75
58	8/27	0.0	6.00	22.66		10.16
65	9/3	0.0	12.00	34.83		13.92
72	9/10	0.0	19.00	53.11		20.80
79	9/17	0.0	31.00	76.38		27.67
86	9/24	0.0	50.00	106.66		34.55
93	10/1	10.86	80.00	149.14	119	42.16
100	10/8	33.16	122.00	210.84		54.17
107	10/15	71.46	180.00	288.54		66.18
114	10/22	127.77	256.00	384.23		78.19
121	10/29	206.07	354.00	501.93	460	90.20
128	11/5	307.21	474.00	640.79		101.70
135	11/12	432.71	618.00	803.29		112.98
142	11/19	581.20	785.00	988.80		124.27
149	11/26	750.68	973.00	1195.32		135.56
156	12/3	937.82	1182.00	1426.18	1115	148.89
163	12/10	1136.51	1407.00	1677.49		164.93
170	12/17	1350.19	1647.00	1943.81		180.98
177	12/24	1575.89	1899.00	2222.11		197.02
184	12/31	1808.57	2158.00	2507.43		213.07
191	1/7	2043.59	2421.00	2798.41		230.07
193	1/14	2281.61	2687.00	3092.39		247.19
205	1/21	2518.61	2952.00	3385.39		264.26
212	1/28	2754.64	3216.00	3677.36		281.32
219	2/4	2991.41	3476.00	3960.59	3704	295.48
226	2/11	3226.75	3731.00	4235.25		307.47
233	2/18	3453.10	3977.00	4500.89		319.45
240	2/25	3668.44	4212.00	4755.56		331.44
247	3/4	3879.17	4433.00	4986.82	4886	337.70
254	3/11	4080.94	4683.00	5195.06		339.67
261	3/18	4264.71	4825.00	5385.29		341.64

Table 1. - (continued)

Days past June 30	Week ending	Lower bound	Normal	Upper bound	1978-79 Observations	St. dev.
261	3/18	4264.71	4825.00	5385.29		341.64
268	3/25	4428.48	4992.00	5555.52		343.61
275	4/1	4569.10	5136.00	5702.90	5530	345.67
282	4/8	4687.88	5259.00	5830.11		348.24
289	4/15	4784.65	5360.00	5935.34		350.82
296	4/22	4864.42	5444.00	6023.57		353.40
303	4/29	4930.21	5514.00	6097.79	5972	355.97
310	5/6	4989.03	5573.00	6156.97		356.08
317	5/13	5038.52	5622.00	6205.48		355.78
324	5/20	5076.00	5659.00	6241.97		355.47
331	5/27	5104.52	5687.00	6269.48		355.17
338	6/3	5122.44	5705.00	6287.56		355.22
345	6/10	5129.55	5713.00	6296.45		355.76
352	6/17	5130.68	5715.00	6299.31		356.29
359	6/24	5129.81	5715.00	6300.18		356.82
365	6/30	5129.06	5715.00	6300.94	6189	357.28

to the weekly heating degree day summaries and outlooks produced by NWS. The additional column contains degree day accumulations during 1978-79 for selected weeks throughout the season. These values are plotted in figure 3 as the dashed line. The heating degree day accumulation nearly reached the upper bound in February and March 1979, then fell later in the season. The tables accompanying the heating and cooling degree day graphs in appendix 2 are truncated in the same manner as the graphs and contain the normal accumulation for the main part of the season.

The geographic pattern of annual degree days for stations and the pattern of annual State degree days, derived from weighting station data across the contiguous United States, may be determined from inspection of figures 4 and 5 for heating degree days and figures 6 and 7 for cooling degree days. Table 2 contains an alphabetical list by States of the stations used in the calculation of the State degree days and their normal annual heating and cooling degree days. Table 3 contains an alphabetical list of the States and the normal annual station weighted heating and cooling degree days.

Figure 4. - Normal seasonal heating degree days (base 65°F) 1941-1970

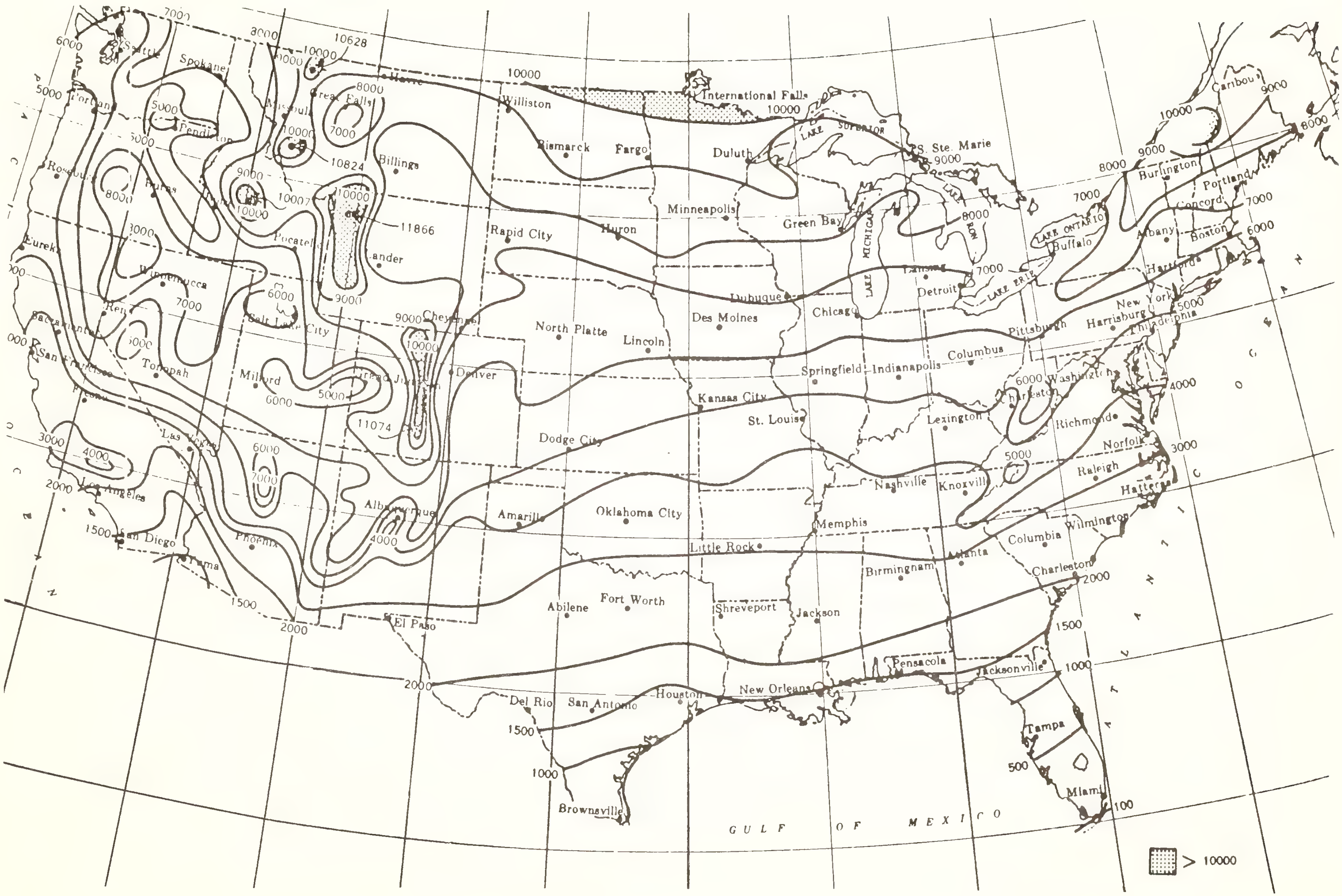


Figure 5. - Annual station weighted state heating degree days

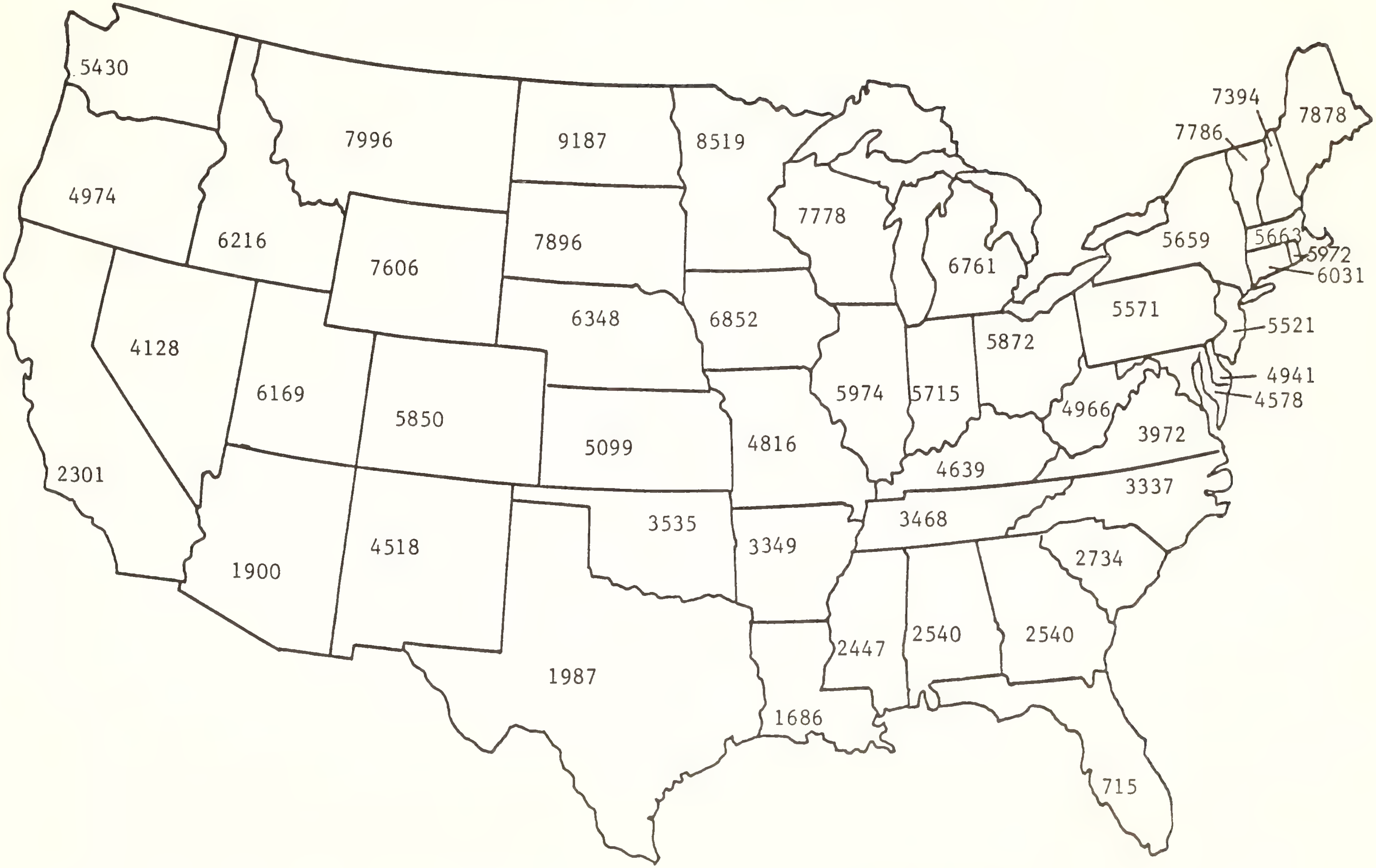


Figure 6. - Normal seasonal cooling degree days (base 65°F) 1941-1970

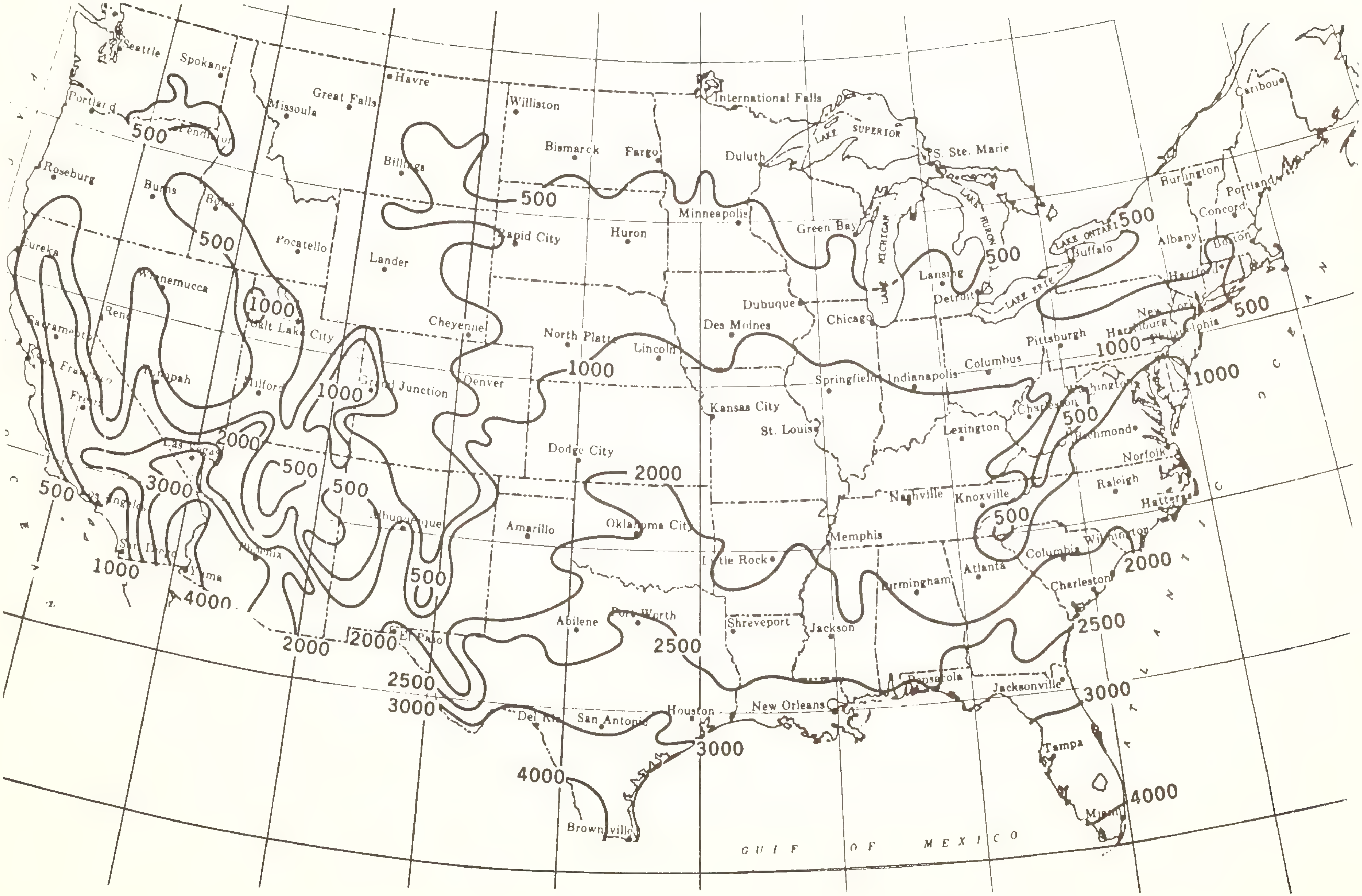


Figure 7. - Annual station weighted state cooling degree days

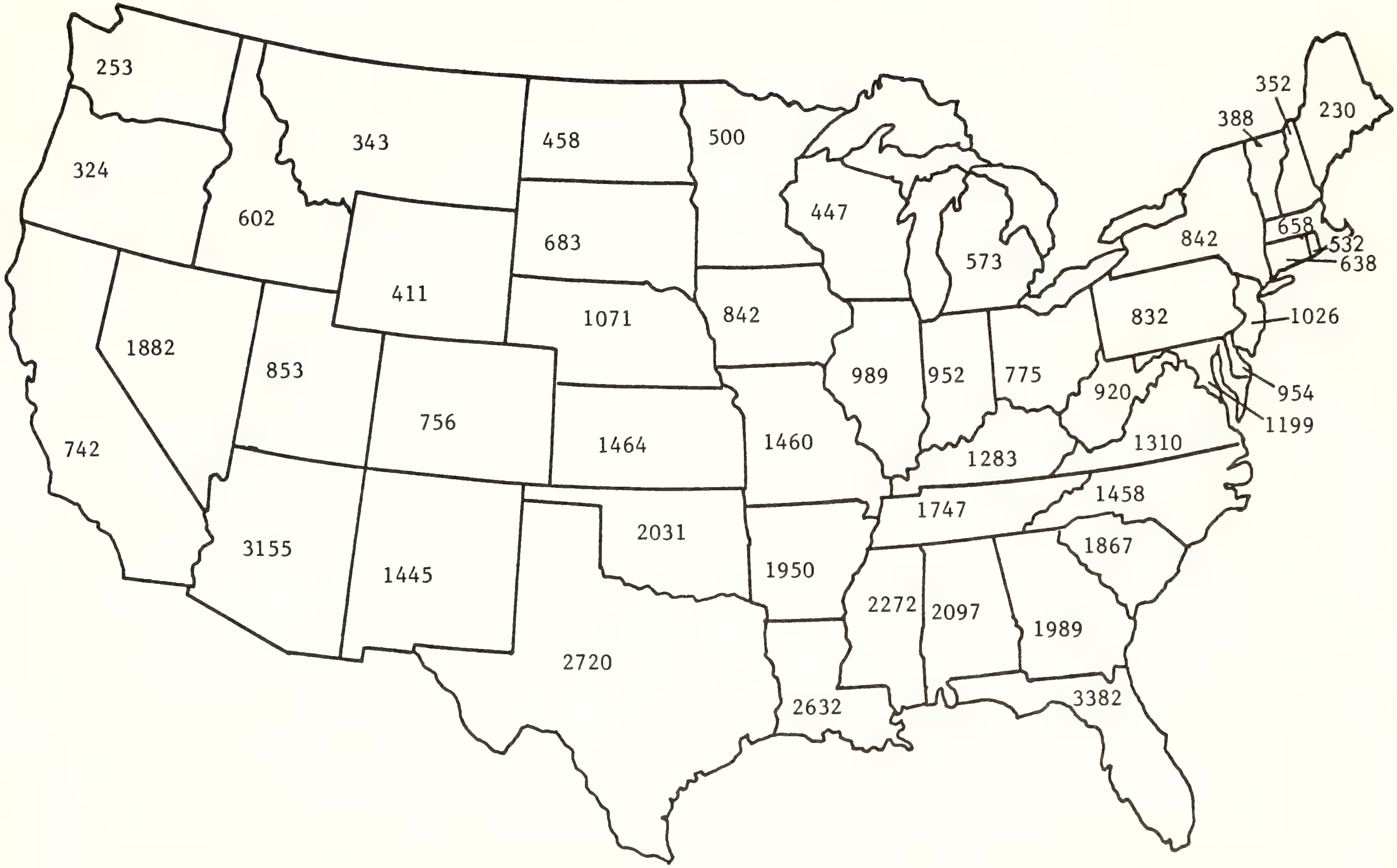


Table 2. - Station annual normal (1941-1970) accumulated degree days

State	Name	Heating (July-June)	Cooling (Jan.-Dec.)
Alabama	Birmingham	2844	1933
Alabama	Mobile	1684	2577
Alabama	Montgomery	2269	2238
Arkansas	Fort Smith	3336	2022
Arkansas	Little Rock	3354	1925
Arizona	Flagstaff	7322	140
Arizona	Phoenix	1552	3512
Arizona	Tucson	1752	2822
Arizona	Winslow	4733	1203
Arizona	Yuma	1005	4195
Arizona	Las Vegas, NV	2601	2962
California	Yuma	1005	4195
California	Bakersfield	2185	2179
California	Eureka	4679	0
California	Fresno	2650	1671
California	Los Angeles	1817	621
California	Red Bluff	2688	1904
California	San Diego	1507	725
California	San Francisco	3042	120
California	Stockton	2806	1259
California	Las Vegas, NV	2601	2962
California	Reno, NV	6022	331
Colorado	Denver	6016	624
Colorado	Grand Junction	5605	1140
Colorado	Pueblo	5394	994
Colorado	Goodland, KS	6119	925
Connecticut	Bridgeport	5461	735
Connecticut	Hartford	6350	584
Delaware	Wilmington	4940	992
Delaware	Atlantic City, NJ	4946	864
Florida	Mobile, AL	1684	2577
Florida	Apalachicola	1361	2663
Florida	Daytona Beach	897	2919
Florida	Ft. Myers	457	3711
Florida	Jacksonville	1327	2603
Florida	Key West	63	4888
Florida	Lakeland	678	3298
Florida	Miami	206	4038
Florida	Orlando	733	3226
Florida	Tallahassee	1563	2564
Florida	Tampa	718	3366
Florida	West Palm Beach	299	3786
Georgia	Tallahassee, FL	1563	2564
Georgia	Atlanta	3095	1581
Georgia	Augusta	2547	1996
Georgia	Macon	2240	2297
Georgia	Savannah	1952	2321

State	Name	Heating (July-June)	Cooling (Jan.-Dec.)
Iowa	Burlington	6149	994
Iowa	Des Moines	6710	928
Iowa	Dubuque	7277	613
Iowa	Sioux City	6953	932
Iowa	Omaha, NE	6049	1173
Idaho	Boise	5833	714
Idaho	Lewiston	5464	657
Idaho	Pocatello	7063	446
Idaho	Missoula, MT	7931	188
Illinois	Cairo	3833	1806
Illinois	Chicago	6127	925
Illinois	Moline	6395	893
Illinois	Peoria	6098	968
Illinois	Rockford	6851	714
Illinois	Springfield	5558	1116
Illinois	Evansville, IN	4624	1372
Illinois	Burlington, IA	6149	994
Indiana	Chicago, IL	6127	925
Indiana	Evansville	4624	1372
Indiana	Ft. Wayne	6209	748
Indiana	Indianapolis	5577	974
Indiana	South Bend	6464	695
Indiana	Louisville, KY	4640	1278
Indiana	Cincinnati, OH	5070	1080
Kansas	Concordia	5623	1302
Kansas	Dodge City	5046	1411
Kansas	Goodland	6119	925
Kansas	Topeka	5243	1371
Kansas	Wichita	4687	1675
Kentucky	Cairo, IL	3833	1806
Kentucky	Evansville, IN	4624	1372
Kentucky	Lexington	4729	1207
Kentucky	Louisville	4640	1278
Louisiana	Baton Rouge	1670	2584
Louisiana	Lake Charles	1498	2742
Louisiana	New Orleans	1465	2704
Louisiana	Shreveport	2167	2538
Louisiana	Jackson, MS	2300	2327
Massachusetts	Boston	5621	661
Massachusetts	Albany, NY	6894	574
Maryland	Wilmington, DE	4940	992
Maryland	Baltimore	4729	1108
Maryland	Harrisburg, PA	5224	1025
Maryland	Pittsburgh, PA	5937	647
Maryland	Norfolk, VA	3488	1454
Maryland	Washington, DC	4211	1415
Maine	Caribou	9632	128
Maine	Portland	7498	252
Michigan	Alpena	8518	211
Michigan	Detroit	6426	654
Michigan	Flint	7041	446
Michigan	Grand Rapids	6801	582

State	Name	Heating (July-June)	Cooling (Jan.-Dec.)
Michigan	Houghton Lake	8347	250
Michigan	Lansing	6906	542
Michigan	Marquette	8351	216
Michigan	Muskegon	6890	477
Michigan	Sault Ste. Marie	9193	139
Minnesota	Duluth	9756	176
Minnesota	International Falls	10547	176
Minnesota	Minneapolis	8159	590
Minnesota	Rochester	8227	472
Minnesota	St. Cloud	8868	426
Minnesota	Fargo, ND	9271	473
Minnesota	Sioux Falls, SD	7838	728
Missouri	Cairo, IL	3833	1806
Missouri	Columbia	5078	1280
Missouri	Kansas City	5357	1285
Missouri	St. Louis	4750	1485
Missouri	Springfield	4573	1384
Mississippi	Mobile, AL	1684	2577
Mississippi	Jackson	2300	2327
Mississippi	Meridian	2388	2231
Mississippi	Memphis, TN	3227	2029
Montana	Billings	7265	498
Montana	Glasgow	8969	438
Montana	Great Falls	7652	341
Montana	Havre	8687	395
Montana	Helena	8190	256
Montana	Kalispell	8554	117
Montana	Miles City	7889	752
Montana	Missoula	7931	188
Montana	Grand Island	6422	1036
Nebraska	Lincoln	6218	1148
Nebraska	Norfolk	6983	925
Nebraska	North Platte	6743	806
Nebraska	Omaha	6049	1173
Nebraska	Valentine	7300	739
North Carolina	Asheville	4237	872
North Carolina	Cape Hatteras	2731	1550
North Carolina	Charlotte	3218	1601
North Carolina	Greensboro	3825	1352
North Carolina	Raleigh	3514	1402
North Carolina	Wilmington	2433	1964
North Dakota	Bismarck	9044	487
North Dakota	Fargo	9271	473
North Dakota	Williston	9161	422
New Hampshire	Concord	7360	349
New Hampshire	Burlington, VT	7876	396
New Jersey	Atlantic City	4946	864
New Jersey	Trenton	4947	968
New Jersey	New York City, NY	4909	1048
New Jersey	Allentown, PA	5827	772
New Jersey	Philadelphia, PA	4865	1104

State	Name	Heating (July-June)	Cooling (Jan.-Dec.)
New Mexico	Winslow, AZ	4733	1203
New Mexico	Alburquerque	4292	1316
New Mexico	Roswell	3697	1560
New Mexico	Amarillo, TX	4183	1433
New Mexico	El Paso, TX	2678	2098
Nevada	Ely	7814	207
Nevada	Las Vegas	2601	2962
Nevada	Reno	6022	331
Nevada	Winnemucca	6629	406
New York	Albany	6894	574
New York	Binghamton	7285	369
New York	Buffalo	6924	437
New York	New York City	4909	1048
New York	Rochester	6720	531
New York	Syracuse	6682	551
New York	Burlington, VT	7876	396
Ohio	Akron	6234	634
Ohio	Cleveland	6160	613
Ohio	Columbus	5702	809
Ohio	Cincinnati	5070	1080
Ohio	Dayton	5641	936
Ohio	Toledo	6386	685
Ohio	Youngstown	6429	518
Ohio	Parkersburg, WV	4817	1045
Oklahoma	Fort Smith, AK	3336	2022
Oklahoma	Dodge City, KS	5046	1411
Oklahoma	Oklahoma City	3695	1876
Oklahoma	Tulsa	3680	1949
Oklahoma	Wichita Falls, TX	2904	2611
Oregon	Boise, ID	5833	714
Oregon	Astoria	5295	14
Oregon	Burns	7212	295
Oregon	Medford	4930	562
Oregon	Pendleton	5240	656
Oregon	Portland	4792	300
Oregon	Salem	4852	243
Pennsylvania	Allentown	5827	772
Pennsylvania	Harrisburg	5224	1025
Pennsylvania	Philadelphia	4865	1104
Pennsylvania	Pittsburgh	5937	647
Pennsylvnia	Wilkes-Barre Scranton	6283	608
Rhode Island	Providence	5972	532
South Carolina	Charlotte, NC	3218	1601
South Carolina	Wilmington, NC	2433	1964
South Carolina	Charleston	2146	2084
South Carolina	Columbia	2598	2089
South Carolina	Greenville-Sprtnbg.	3163	1577
South Dakota	Valentine, NE	7300	739
South Dakota	Aberdeen	8617	566
South Dakota	Huron	8055	711
South Dakota	Rapid City	7324	661
South Dakota	Sioux Falls	7838	728

State	Name	Heating (July-June)	Cooling (Jan.-Dec.)
Tennessee	Chattanooga	3505	1642
Tennessee	Knoxville	3478	1568
Tennessee	Memphis	3227	2029
Tennessee	Nashville	3696	1697
Texas	Shreveport, LA	2167	2538
Texas	Abilene	2610	2466
Texas	Amarillo	4183	1433
Texas	Austin	1737	2921
Texas	Brownsville	652	3874
Texas	Corpus Christi	930	3474
Texas	Del Rio	1523	3364
Texas	El Paso	2678	2098
Texas	Forth Worth	2382	2587
Texas	Galveston	1224	3007
Texas	Houston	1434	2887
Texas	Lubbock	3545	1647
Texas	Midland	2621	2250
Texas	Port Arthur-Beaumont	1518	2792
Texas	San Angelo	2240	2702
Texas	San Antonio	1570	3006
Texas	Victoria	1227	3140
Texas	Waco	2058	2863
Texas	Wichita Falls	2904	2611
Utah	Grand Junction, CO	5605	1140
Utah	Pocatello, ID	7063	446
Utah	Ely, NV	7814	207
Utah	Las Vegas, NV	2601	2962
Utah	Salt Lake City	5983	927
Virginia	Lynchburg	4233	1100
Virginia	Norfolk	3488	1454
Virginia	Richmond	3939	1366
Virginia	Roanoke	4307	1030
Virginia	Washington, D.C.	4211	1415
Vermont	Concord, NH	7360	394
Vermont	Burlington	7876	396
Washington	Lewiston, ID	5464	657
Washington	Quillayute	5951	8
Washington	Spokane	6835	392
Washington	Walla Walla	4835	862
Washington	Yakima	6009	479
Wisconsin	Houghton Lake, MI	8347	250
Wisconsin	Duluth, MN	9756	176
Wisconsin	Green Bay	8098	386
Wisconsin	LaCrosse	7419	701
Wisconsin	Madison	7730	460
Wisconsin	Milwaukee	7444	450
West Virginia	Harrisburg, PA	5224	1025
West Virginia	Beckley	5615	490
West Virginia	Charleston	4590	1066
West Virginia	Huntington	4624	1109

State	Name	Heating (July-June)	Cooling (Jan.-Dec.)
West Virginia	Parkersburg	4817	1045
Wyoming	Rapid City, SD	7324	661
Wyoming	Casper	7555	458
Wyoming	Cheyenne	7255	327
Wyoming	Lander	7868	383
Wyoming	Sheridan	7708	446

Table 3. - State annual normal degree days

STATE	HDD NORMAL	CDD NORMAL
Alabama	2540	2097
Arizona	1900	3155
Arkansas	3349	1950
California	2301	724
Colorado	5850	756
Connecticut	6031	638
Delaware	4941	954
Florida	715	3382
Georgia	2540	1989
Idaho	6216	602
Illinois	5974	989
Indiana	5715	952
Iowa	6852	842
Kansas	5099	1464
Kentucky	4639	1283
Louisiana	1686	2632
Maine	7878	230
Maryland	4578	1199
Massachusetts	5663	658
Michigan	6761	573
Minnesota	8519	500
Mississippi	2447	2272
Missouri	4876	1415
Montana	7996	343
Nebraska	6348	1017
Nevada	4128	1882
New Hampshire	7393	352

Table 3 continued

STATE	HDD NORMAL	CDD NORMAL
New Jersey	4939	1026
New Mexico	4043	1445
New York	5659	842
North Carolina	3337	1458
North Dakota	9187	458
Ohio	5872	775
Oklahoma	3535	2031
Oregon	4974	324
Pennsylvania	5571	832
Rhode Island	5972	532
South Carolina	2734	1867
South Dakota	7896	683
Tennessee	3468	1747
Texas	1987	2720
Utah	6169	853
Vermont	7786	388
Virginia	3972	1310
Washington	5430	253
West Virginia	4966	920
Wisconsin	7778	447
Wyoming	7606	411

Operational Use of the Graphs and Tables

One important use for the State graphs and tables is tracking current degree day values through the heating or cooling season. This can be accomplished by using current reports on State degree day values produced by the NWS-CAC and the EDIS-CEAS. The CAC produces a weekly summary of degree days which includes a table and map of the weekly and cumulative values for the current and the previous years. Normal degree days for the contiguous United States are also included. The table and map are reproduced in table 4 and figure 8. For heating degree days these are produced during the heating season starting about the third week in October and continuing through the last week in April. During the cooling season (the first week of June through the last week in September) they are produced for cooling degree days.

In addition, the NWS-CAC produces a weekly summary and outlook of heating degree days from about the first week in November through the last week in April. This information is transmitted through the NWS RAWARC (Radar Reports and Warning Coordination) network to National Weather Service offices throughout the country. This procedure makes the State heating degree day information accessible in real time to any location in the country. At the present time this weekly summary and forecast is routinely relayed by the forecast offices in many States to State officials and others. A copy of a weekly summary and outlook is reproduced in table 5. As can be seen, the weekly and seasonal summary of heating degree days is the same as in the NWS summary. The additional columns contain information on the coming week. On Monday mornings, the weekly summary information is compiled through Sunday. The summary and forecast are compiled on Wednesday mornings. The forecast for the week combines observed data for Monday and Tuesday and a forecast for the period Wednesday through Sunday.

In Figure 9 the use of the graph in conjunction with the weekly summary and forecast is illustrated in table 5, 4106 (col. 4). The initial value for Indiana is day 164 because February 11 is 164 days from August 31, 1978. The normal accumulation, 3731 (col. 5) is the center line. The forecast for the week ending February 18 is 295 (col. 7). The expected accumulation at the end of the week is the sum, 4106 + 295 = 4401. This is plotted at day 171, February 18. The observed number of degree days for the week was 332, giving a seasonal accumulation of 4438. This is also plotted at day 171. The normal amount accumulated in the week ending February 18 is 246 (col. 8). As can be seen on the graph and in the table, these accumulations are close to the upper bound of the confidence interval.

Another, more comprehensive, published product can be employed operationally with the graphs to analyze current projected degree day accumulations. This publication is the Environmental/Resource Assessment and Information - Energy/Climate Section (E/ RAI-ECS), a weekly publication of the CEAS (3). Each week it contains a summary of State, regional and national station population weighted degree days. A sample of this information is reproduced in table 5. In conjunction with the table, the publication contains maps depicting the State and regional degree day values, a written weather analysis describing temperature changes over the period in terms of changing synoptic patterns, and a qualitative assessment of the effects of temperature anomalies on temperature related energy consumption.

Table 4 - Population-weighted state averages of heating degree days, last date of collection period is 2-11-1979

STATE	WEEKLY TOTALS CURRENT	 NORMAL	 LAST YR	CUMULATIVE FROM JULY 1 CURRENT	 NORMAL	 LAST YR
Alabama	189	124	214	1876	1817	2140
Arizona	89	92	50	1394	1347	765
Arkansas	266	162	252	2747	2364	2654
California	80	85	63	1376	1373	896
Colorado	230	229	235	4398	3718	3608
Connecticut	357	266	316	3988	3774	3821
Delaware	348	227	309	3275	3175	3476
Washington, D.C.	297	203	263	2604	2800	2848
Florida	67	46	99	512	519	720
Georgia	186	125	197	1787	1802	2119
Idaho	221	228	173	4789	4013	3533
Illinois	409	268	352	4537	3885	4460
Indiana	401	225	369	4106	3731	4174
Iowa	435	300	379	5199	4489	5021
Kansas	351	225	316	4175	3421	3814
Kentucky	340	213	341	3419	3109	3566
Louisiana	161	91	182	1423	1236	1616
Maine	404	316	368	4981	4859	4973
Maryland	316	213	283	2892	3007	3125
Massachusetts	339	252	283	3644	3505	3467
Michigan	404	288	363	4601	4250	4645
Minnesota	473	362	400	6099	5498	6010
Mississippi	201	123	216	1954	1754	2098
Missouri	350	220	334	3886	3239	3844
Montana	307	293	315	6106	5082	5617
Nebraska	388	273	360	4999	4180	4729
Nevada	143	158	134	2922	2732	2136
New Hampshire	396	309	388	5007	4665	5071
New Jersey	341	230	288	3225	3131	3411
New Mexico	182	175	153	2854	2803	2446
New York	365	255	312	3714	3536	3772
North Carolina	239	158	239	2214	2258	2558

Table 4 continued

STATE	WEEKLY TOTALS CURRENT	NORMAL	LAST YR	CUMULATIVE FROM JULY 1 CURRENT	NORMAL	LAST YR
North Dakota	480	382	417	6766	5941	6642
Ohio	393	257	367	4016	3764	4221
Oklahoma	279	168	266	3007	2466	2869
Oregon	129	167	154	3585	3113	2960
Pennsylvania	373	247	318	3721	3581	3842
Rhode Island	362	256	320	3879	3682	3821
South Carolina	204	134	214	1878	1992	2213
South Dakota	418	328	379	5936	5098	5763
Tennessee	267	165	260	2602	2412	2793
Texas	159	103	190	1760	1433	1768
Utah	239	235	165	4302	3987	3169
Vermont	459	330	412	5215	4888	5108
Virginia	291	188	264	2634	2640	2851
Washington	152	178	143	3691	3419	3139
Wyoming	279	275	264	5857	4732	4837

Figure 8. - Weekly summary of heating degree day departures

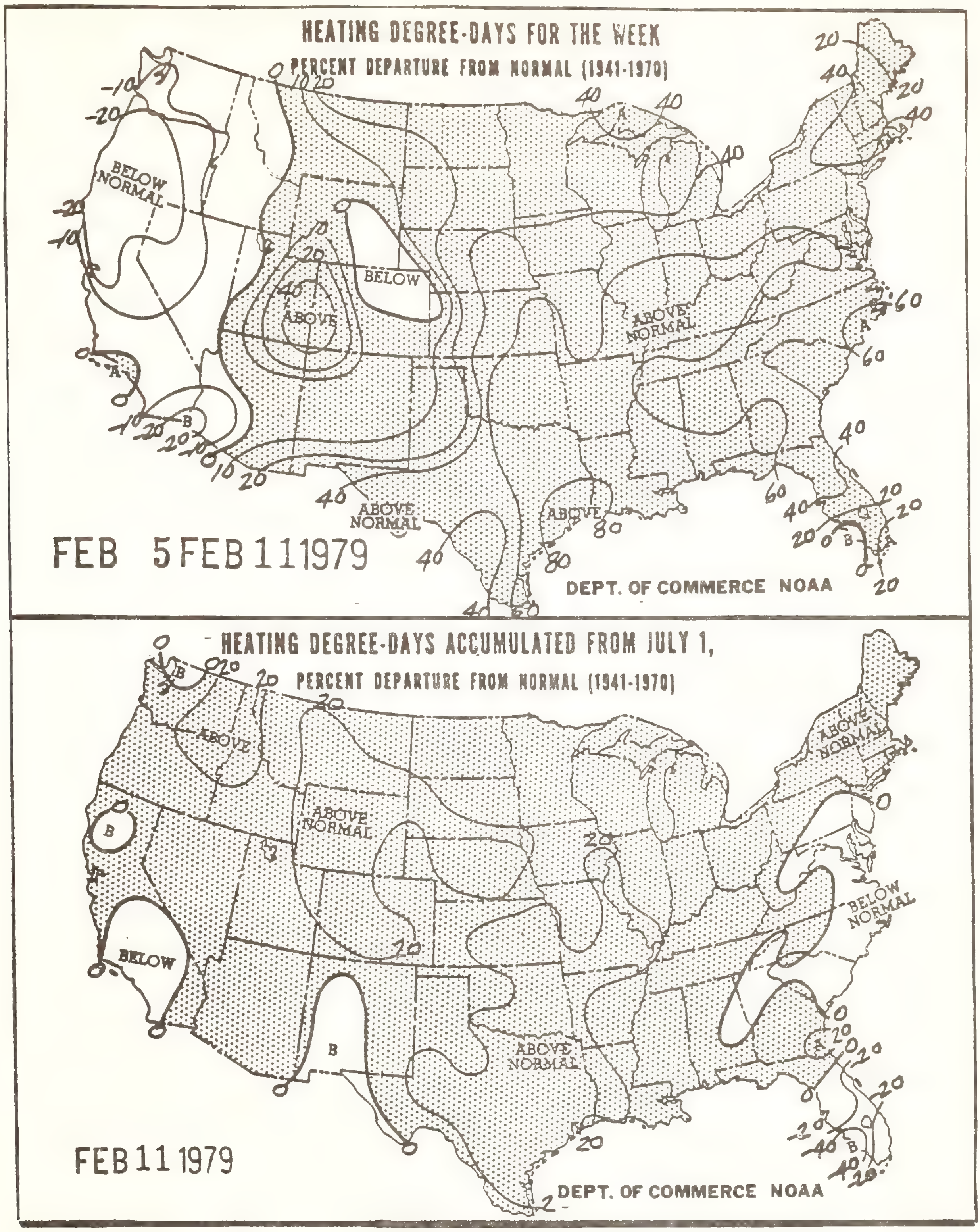


Figure 8 continued - Weekly summary of heating degree day departures

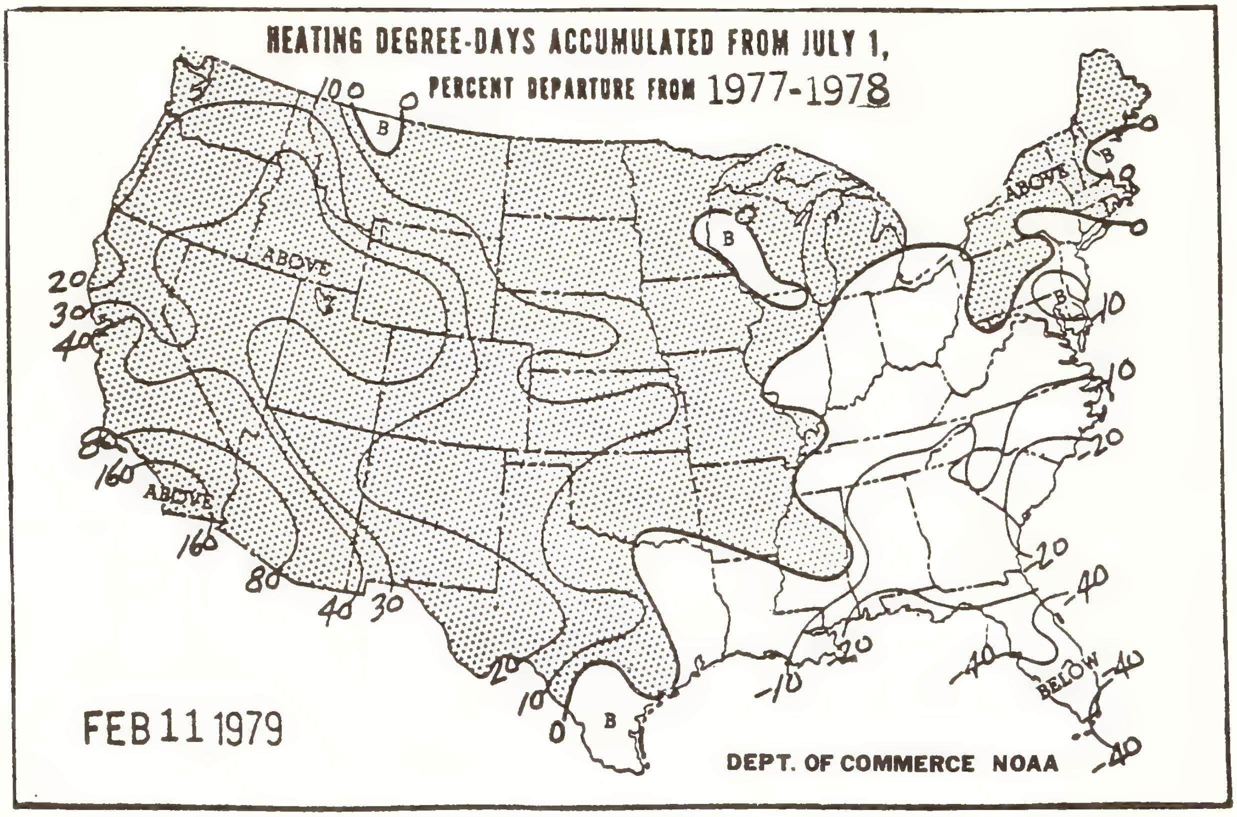


Table 5. Population weighted state degree day summary and forecast

	WEEKLY OBSVD ENDS 2/11/79			SUM FROM JUL 1 ENDS 2/11/79			WEEKLY FCST ENDS 2/18/79		
	CURR	NORM	L.YR	CURR	NORM	L.YR	CURR	NORM	L.YR
Connecticut	357	266	316	3988	3774	3821	373	259	265
Delaware	348	227	309	3275	3175	3476	317	221	278
Washington, D.C.	297	203	263	2604	2800	2848	270	195	207
Indiana	401	255	369	4106	3731	4174	295	246	322
Kentucky	340	213	341	3419	3109	3566	242	205	265
Maine	404	316	368	4981	4859	4973	444	310	288
Maryland	316	213	283	2892	3007	3125	291	208	229
Massachusetts	339	252	283	3644	3505	3467	367	246	236
New Hampshire	396	309	388	5007	4665	5071	440	301	331
New Jersey	341	230	288	3225	3131	3411	329	224	249
New York	365	255	312	3714	3536	3772	365	249	269
North Carolina	239	158	239	2214	2258	2558	176	153	176
Ohio	373	247	318	3721	3581	3842	339	242	282
Rhode Island	362	256	320	3879	3682	3821	368	251	281
Vermont	459	330	412	5215	4888	5108	481	321	359
Virginia	291	188	264	2634	2640	2851	243	183	210
West Virginia	348	219	334	3415	3271	3699	268	215	255
(Column number	1	2	3	4	5	6	7	8	9)

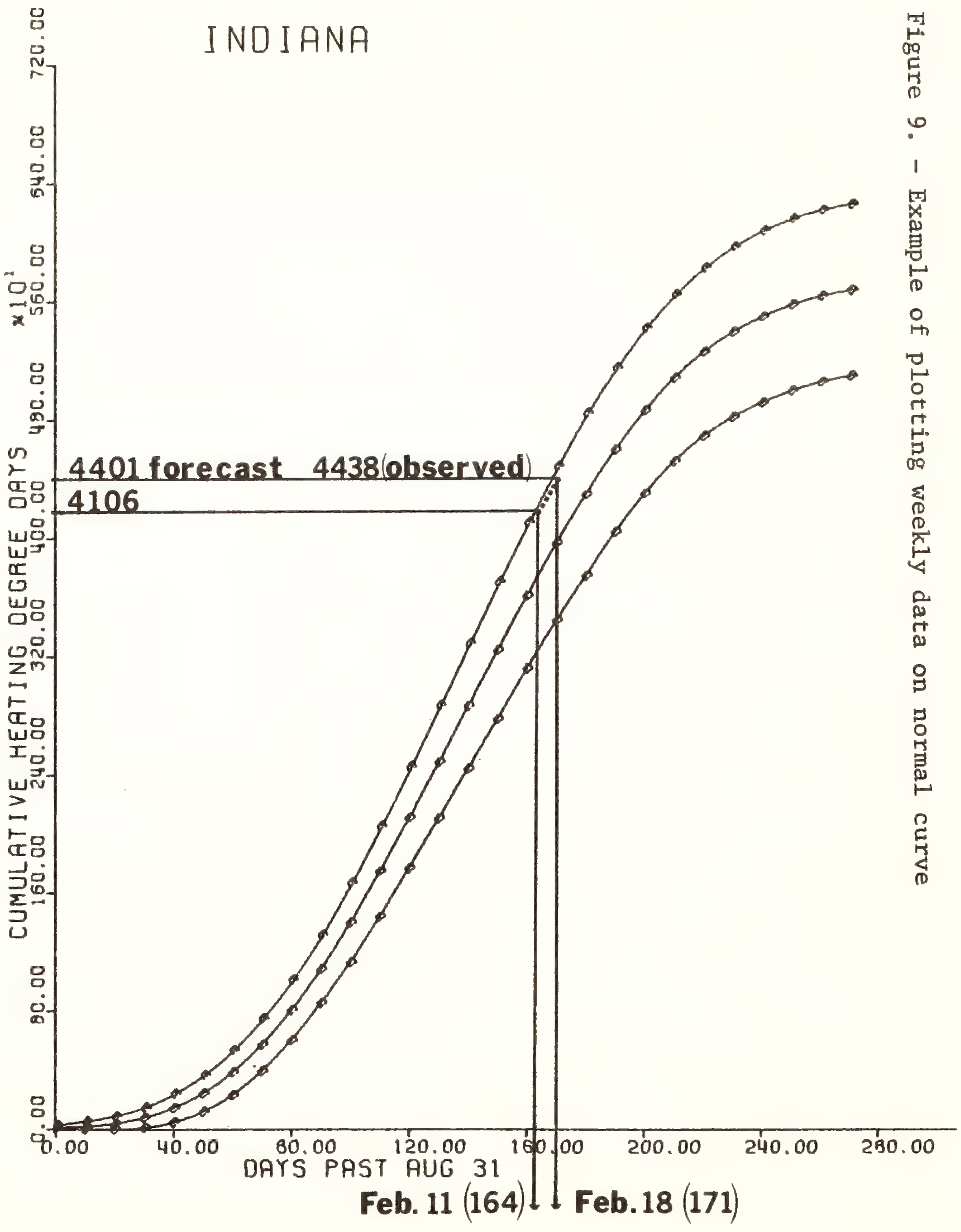


Figure 9. - Example of plotting weekly data on normal curve

INDIANA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	19	53	21
20	0	38	88	31
30	9	75	141	40
40	43	137	231	58
50	109	232	355	75
60	218	369	520	92
70	376	553	730	108
80	581	785	989	124
90	830	1060	1290	140
100	1107	1374	1641	163
110	1414	1718	2022	186
120	1741	2083	2425	208
130	2078	2459	2840	233
140	2418	2839	3260	257
150	2755	3216	3677	281
160	3093	3586	4079	301
170	3421	3942	4463	318
180	3727	4276	4825	335
190	4025	4581	5137	339
200	4289	4850	5411	342
210	4512	5077	5642	345
220	4688	5259	5830	348
230	4821	5398	5975	352
240	4922	5505	6088	356
250	5004	5588	6172	356
260	5067	5650	6233	356
270	5109	5691	6273	355
273	5117	5699	6281	355

STATION	WEIGHT
CHICAGO, IL	.1421
LOUISVILLE, KY	.0198
CINCINNATI, OH	.0420
EVANSVILLE	.0838
FT. WAYNE	.0949
INDIANAPOLIS	.4823
SOUTH BEND	.1351

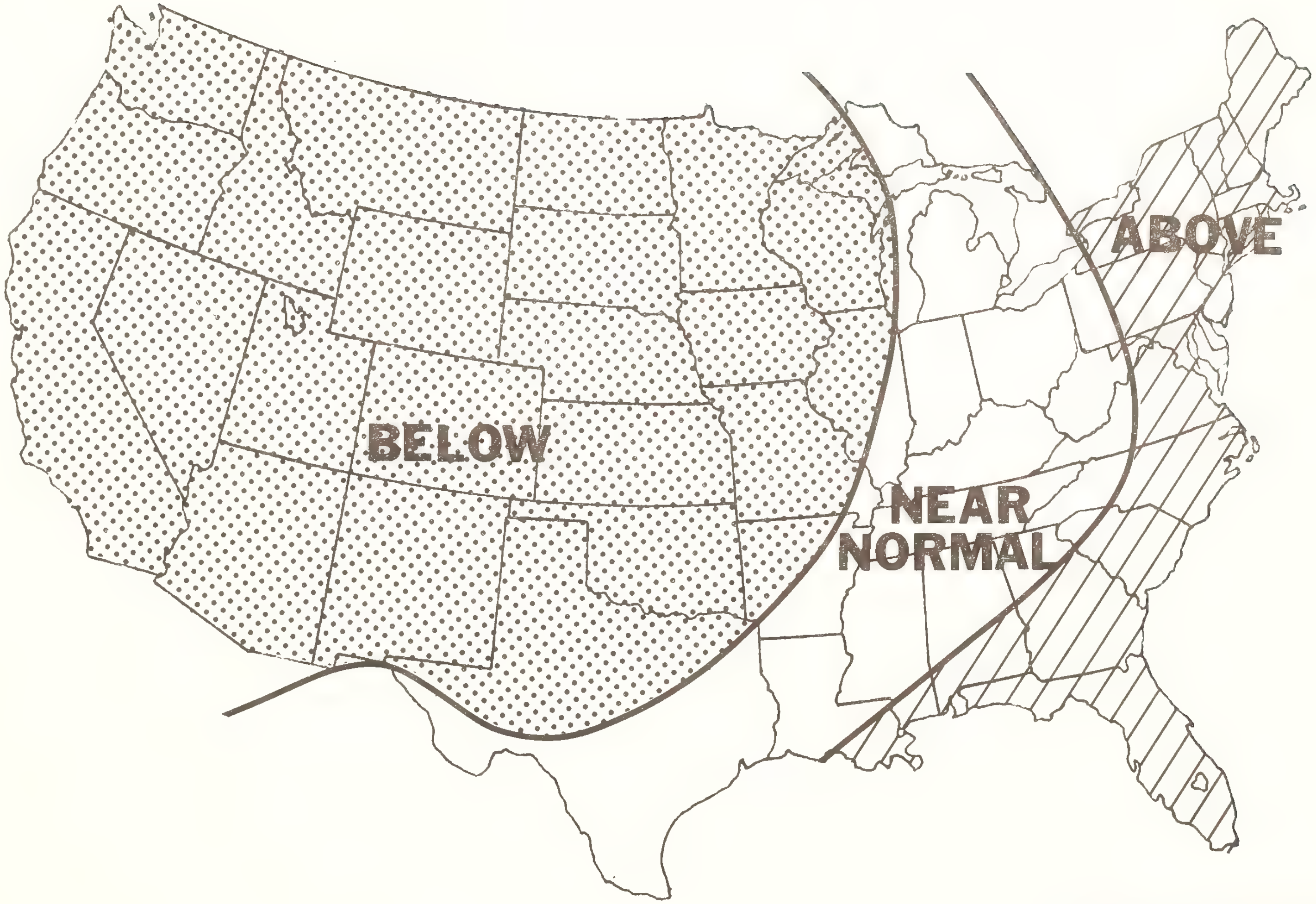
The first week issue of each month contains information on projected accumulations of degree days for the coming month, for three months and the projected degree day accumulation for the season for the States. These degree day outlooks are derived from the 30-day (fig. 10), 90-day seasonal, and 90-day experimental (fig. 11) temperature outlooks of the NWS-CAC using an algorithm presented in appendix 1 (4). Examples of the outlook are presented in tables 6 and 7.

The use of these outlooks in conjunction with the graph is similar to the use of the weekly projection. This is illustrated in figure 12. From table 6, the initial value, 2029, of the acccumulated degree days from July 1 through December 31, 1978 is in the first row. This amount is plotted on the graph in figure 12 at day 122 because December 31 is 122 days past August 31. This is below the normal amount as shown in the graph and also in column 3 of figure 12. The percentile of the accumulations is 30.55 (normal is 50). The expected accumulation of heating degree days in January is computed from the outlook for average temperature in figure 10 as shown in table 6. The expected accumulation at the end of January is the sum, 2029 + 1170 = 3199. Based on the uncertainty of the temperature outlook, the upper and lower bounds of a confidence interval on the outlook are calculated and given in row 5, table 6 -- the lower bound is 876 and the upper 1463. Using these values the bounds on the expected accumulation at the end of January are 2905 and 3492. These bounds are plotted at day 153 and bracket the expected amount, 3199. As can be seen on the graph, the forecast amount for January was near the upper bound of the confidence interval; the expected amount and the total accumulation were above the normal line. (The other rows in table 6 contain a comparison of the current totals to last year and a seasonal projection based on the one month outlook and climatology.) This projection is not plotted on the graph of figure 8 but would be very close to the normal line.

Table 7 contains the heating degree day projection based on the Experimental 90-day outlook for average temperatures in figure 11. Table 7 gives the same initial value at the end of December, 2029. In line 4 the outlook for January through March is 3020, in line 5 the lower bound is 2564 and the upper 3442. When added to the initial value these values give an expected accumulation at the end of March of a near normal amount of 5049; a lower bound on the expectation is 4593 and an upper bound 5471. These three values are plotted at day 212 or March 31, which is 212 days past August 31. The observed heating degree days for January through March were 3476, just beyond the upper bound of the confidence interval. This brought the seasonal accumulation through March to 5505 which is well above normal.

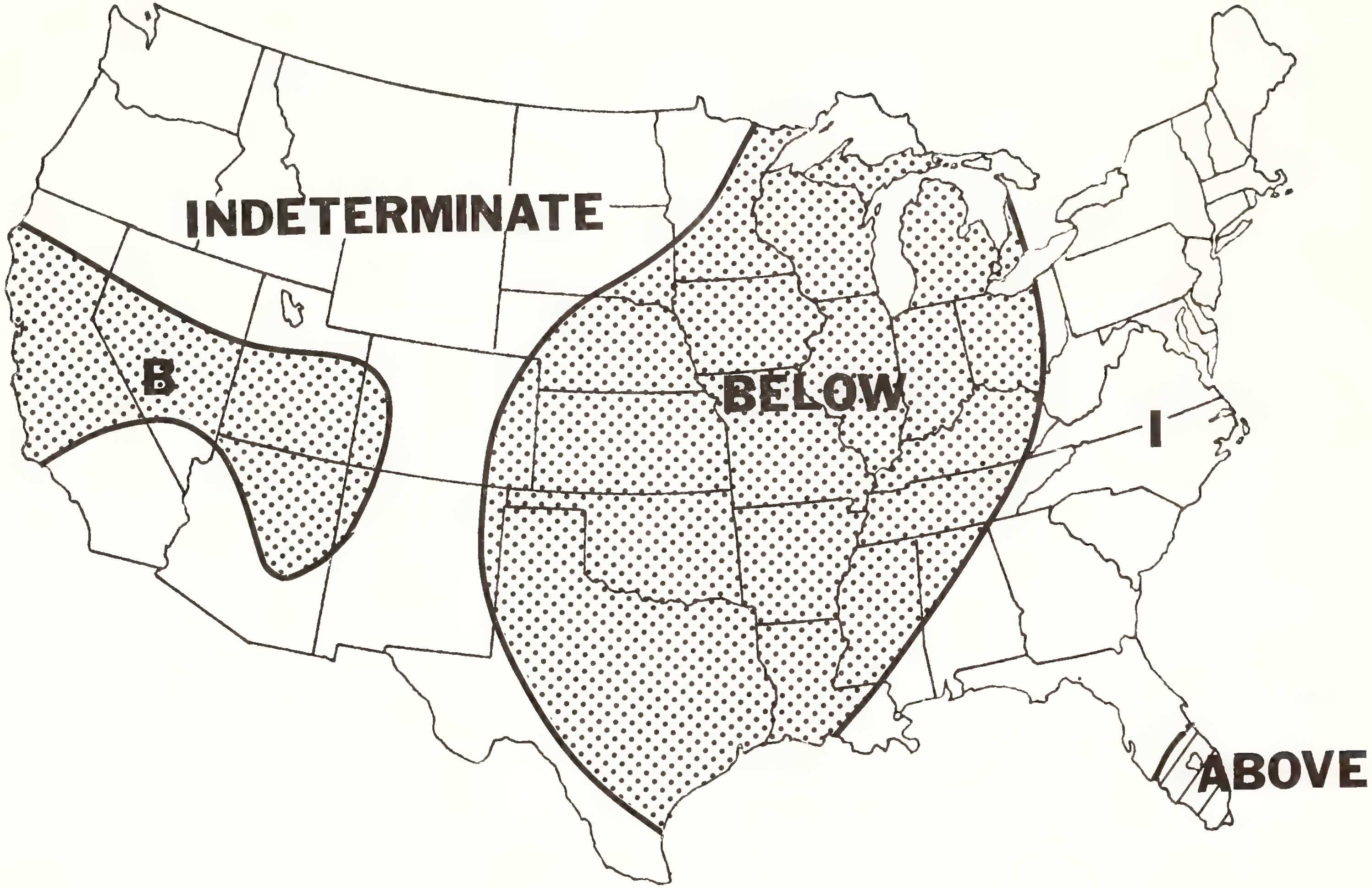
Row 7 of table 7 contains the projected heating degree day total for the season (July-June) (5634). This is calculated using the observed data from July - December (2029), the projected amount for January - March (3020), and the climatological normal amount for April - June (585). Because the seasonal projection is based on two projections, the confidence interval has an approximate value of 80 percent between the lower bound 5006 and the upper bound 6228. These values are plotted at day 273, May 31, at the end of the graph. Thus, the degree day accumulation for the season was expected to be slightly less than normal. The actual accumulation observed was 5994. As shown on the graph this amount is above normal but within the range of the confidence interval around the projected amount. This exercise demonstrated the use of the tables and graphs in conjunction with operational products and the potential range of the forecast variability.

Figure 10. - Average monthly weather outlook, January 1979



National Weather Service
Climate Analysis Center

Figure 11. - Experimental outlook for 90-day average temperatures, Jan.-Mar. 1979



National Weather Service
Climate Analysis Center

Table 6. East North Central Division, heating degree day summary and outlook (base 65 deg - stations weighted by population) one month outlook

Season: September 1, 1978 - June 1, 1979
NOAA-EDIS-CENTER FOR ENVIRONMENTAL ASSESSMENT SERVICES

	IL	IN	MI	OH	WI
1. Accumulation to Date (12/31/78)	2269	2029	2483	2041	2859
2. Accumulation to Date/ Accumulation to Date 1977	0.96	0.95	0.96	0.93	0.97
3. Percentile of Accum.	59.85	30.55	53.67	26.36	50.16
4. Outlook for Period (1/79)	1282	1170	1289	1157	1521
5. 90% Confidence Interval on Outlook	993 1549	876 1463	1045 1532	860 1453	1241 1781
6. Ratio of Prediction & Confidence Interval for Period to Period Last Year	0.84 0.65 1.02	0.81 0.60 1.01	0.91 0.74 1.08	0.81 0.61 1.02	0.93 0.76 1.09
7. Expected Accumulation for Season	6044	5571	6687	5684	7666
8. 80% Confidence Interval for Season	5406 6660	4916 6225	6092 7281	5040 6327	7012 8300
9. Ratio of Expected Accum. and Confidence Interval for Season to Season Last Year	0.87 0.78 0.96	0.87 0.77 0.97	0.91 0.82 0.99	0.85 0.76 0.95	0.94 0.86 1.02
10. %-ile of Expected Accumulation	61.73	37.50	52.50	34.77	54.54

Table 7. - East North Central Division, heating degree day summary and outlook (base 65 deg F - stations weighted by population) three month outlook

Season: September 1, 1978 - June 1, 1979
NOAA-EDIS-CENTER FOR ENVIRONMENTAL ASSESSMENT SERVICES

	IL	IN	MI	OH	WI
1. Accumulation to Date (12/31/78)	2269	2029	2483	2041	2859
2. Accumulation to Date/ Accumulation to Date 1977	0.96	0.95	0.96	0.93	0.97
3. Percentile of Accum.	59.85	30.55	53.67	26.36	50.16
4. Outlook For Period (1/79 - 3/79)	3178	3020	3427	3054	3880
5. 90% Confidence Interval on Outlook	2751 3572	2564 3442	3063 3765	2613 3462	3457 4272
6. Ratio of Prediction and Confidence Interval for Period to Period Last Year	0.83 0.72 0.93	0.82 0.69 0.93	0.87 0.78 0.95	0.81 0.70 0.92	0.92 0.82 1.02
7. Expected Accumulation for Season	6063	5634	6737	5745	7686
8. 80% Confidence Interval For Season	5458 6636	5006 6228	6173 7275	5129 6327	7057 8284
9. Ratio of Expected Accumulation and Confidence Interval for Season to Season Last Year	0.88 0.79 0.96	0.88 0.78 0.97	0.91 0.84 0.99	0.86 0.77 0.95	0.95 0.87 1.02
10. %-ile of Expected Accumulation	63.88	44.06	58.74	41.09	56.79

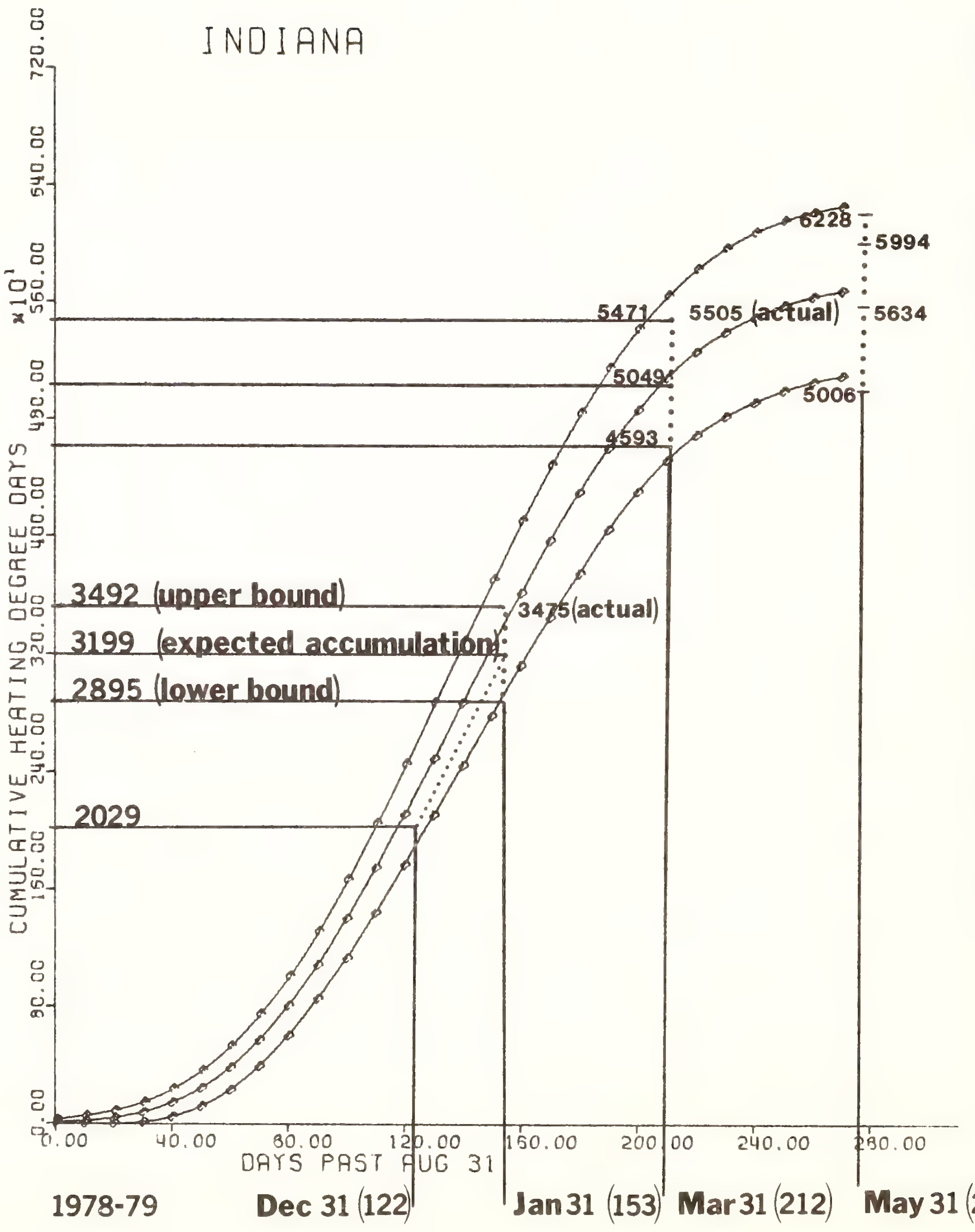


Figure 12. - Example of plotting monthly data on normal curve

INDIANA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	19	53	21
20	0	38	88	31
30	9	75	141	40
40	43	137	231	58
50	109	232	355	75
60	218	369	520	92
70	376	553	730	108
80	581	785	989	124
90	830	1060	1290	140
100	1107	1374	1641	163
110	1414	1718	2022	186
120	1741	2083	2425	208
130	2078	2459	2840	233
140	2418	2839	3260	257
150	2755	3216	3677	281
160	3093	3536	4079	301
170	3421	3942	4463	318
180	3727	4276	4825	335
190	4025	4581	5137	339
200	4289	4850	5411	342
210	4512	5077	5642	345
220	4688	5259	5830	348
230	4821	5398	5975	352
240	4922	5505	6088	356
250	5004	5588	6172	356
260	5067	5650	6233	356
270	5109	5691	6273	355
273	5117	5699	6281	355

STATION	WEIGHT
CHICAGO, IL	.1421
LOUISVILLE, KY	.0198
CINCINNATI, OH	.0420
EVANSVILLE	.0838
FT. WAYNE	.0949
INDIANAPOLIS	.4823
SOUTH BEND	.1351

These weekly, monthly, three-monthly, and seasonal outlooks can be used to estimate heating fuel needs from the degree day ratios. They can be used to produce more accurate estimates of energy consumption using an estimated consumption relation derived from past data. Using data on regional natural gas consumption, a relation was developed to estimate current consumption and project consumption in the coming periods on the basis of the heating degree day outlooks. The natural gas summaries and outlooks corresponding to the degree day summaries and outlooks are reproduced in tables 8 and 9. These are published monthly in the E/RAI-ECS with the degree summary and outlooks. It is also possible to develop State weekly models of natural gas or other energy consumption that can be used on a shorter time and space scale than a monthly or quarterly basis. As a demonstration, one such model developed by CEAS is illustrated in figure 13. On this graph, weekly total natural gas sendout for Missouri is plotted on the vertical and weekly station weighted state heating degree days on the horizontal for weeks in 1973 and 1974. Assuming the relation is valid, current Missouri weekly degree day totals can be used to estimate the current weekly sendout of natural gas.

Other Uses of the Graphs and Tables

Although the graphs and tables are designed for operational use, they have potential use in contingency planning and simulation. Data on energy and economic variables are collected by political sub-divisions i.e., station regions. Station weighted State degree days provide a good index of weather sensitive energy consumption.

The confidence interval bounds provide good estimates of the range of variability of the accumulated degree days at any point in a season. The standard deviation can be used in determining the probability of occurrence of other degree day amounts through standard statistical calculations.

Table 8. - Summary and outlook for natural gas demand by residential and commercial customers by division one month outlook (trillions of BTU)

Season: September 1978 - May 1979
NOAA-EDIS-Center for Environment Assessment Services

	TOTAL	NEN	MAT	ENC
1. EST CONSUMPTION TO DATE: (12/31/78)	2550.32	71.78	310.49	828.07
2. EST CONSUMPTION TO DATE L YR: (12/31/77)	2501.09	66.15	318.03	850.55
3. EST CONS TO DATE/ EST CONS TO DATE L YR	1.02	1.09	0.98	0.97
4. PREDICTED DEMAND FOR PERIOD 1/79	1153.03	30.37	141.30	373.55
5. 90% CONF INTERVAL FOR PREDICTION	926.40 1377.27	25.56 35.57	114.71 170.02	306.28 440.81
6. EST CONS FOR PERIOD 1/78	1277.15	31.74	156.40	426.72
7. PRED CONS/ EST CONS LAST YR	0.90	0.96	0.90	0.88
8. LOWER BOUND/ EST CONS LAST YR	0.73	0.81	0.73	0.72
UPPER BOUND/ EST CONS LAST YR	1.08	1.12	1.09	1.03
9. PRED CONSUMPTION FOR SEASON 1978-1979	6479.17	182.48	811.38	2120.54
10. 80% CONF INTERVAL FOR SEASON	5950.20 7005.76	170.63 194.72	749.31 875.58	1969.45 2271.64
11. EST CONSUMPTION FOR SEASON 1977-1978	6727.45	181.49	870.53	2306.37
12. SEASON PRED CONS/ EST CONS LAST YR	0.96	1.01	0.93	0.92
13. LOWER BOUND/ EST CONS LAST YR	0.88	0.94	0.86	0.85
UPPER BOUND/ EST CONS LAST YR	1.04	1.07	1.01	0.98

NEN - New England, MAT - Mid Atlanta, ENC - East North Central
Other divisions not shown due to space limitations; West North Central, South Atlanta, East South Central, Mountain, Pacific

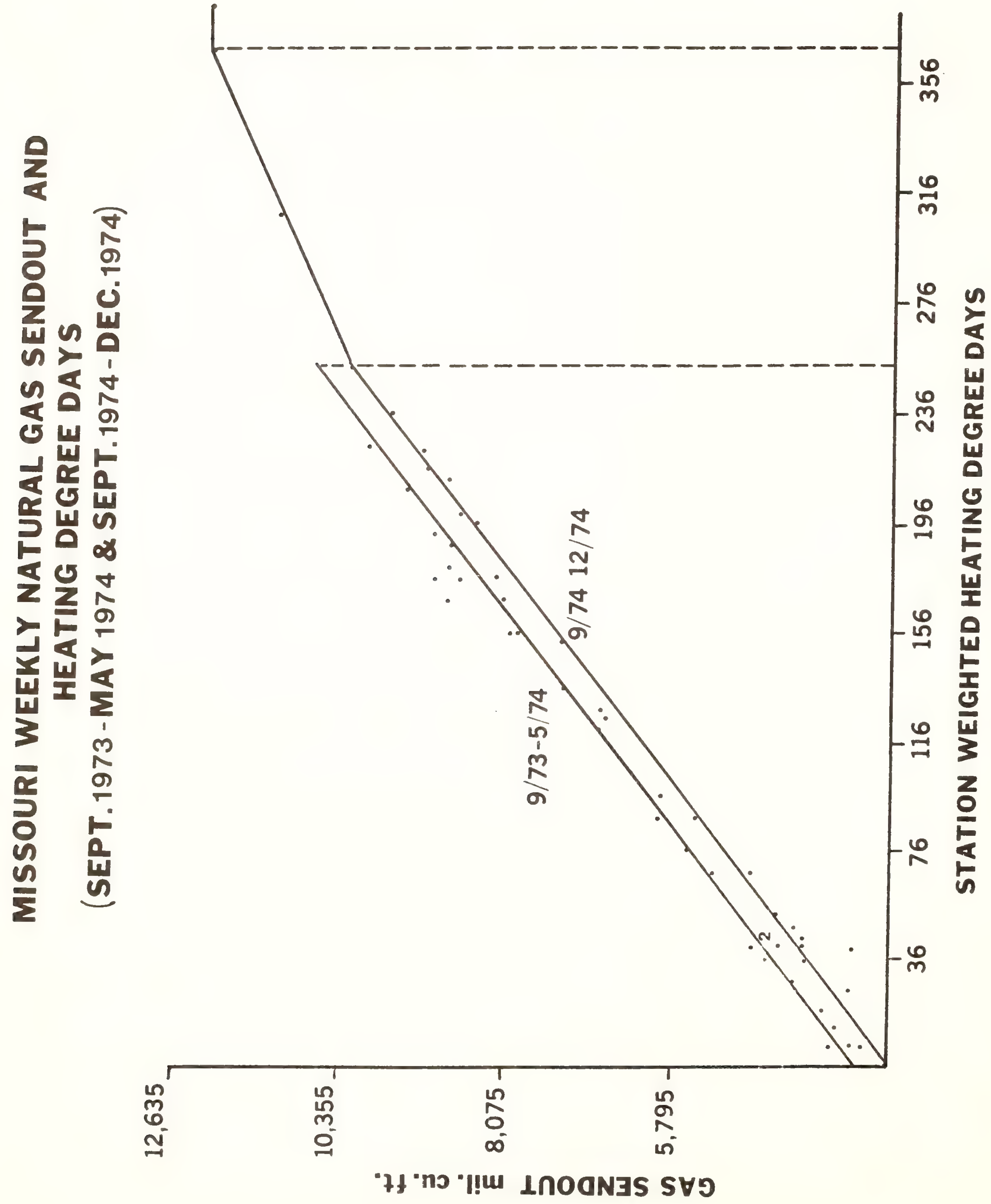
Table 9. - Summary and outlook for natural gas demand by residential and commercial customers by division three month outlook (trillions of BTU)

Season: September 1978 - May 1979
NOAA-EDIS-CENTER FOR ENVIRONMENTAL ASSESSMENT SERVICES

		TOTAL	NEN	MAT	ENC
1.	EST CONSUMPTION TO DATE: (12/31/78)	2550.32	71.78	310.49	828.07
2.	EST CONSUMPTION TO DATE L YR: (12/31/77)	2501.09	66.15	318.03	850.55
3.	EST CONS TO DATE/ EST CONS TO DATE L YR	1.02	1.09	0.98	0.97
4.	PREDICTED DEMAND FOR PERIOD 1/79-3/79	3031.42	83.68	388.64	1001.00
5.	90% CONF INTERVAL FOR PREDICTION	2668.78	76.85	350.20	901.21
		3374.75	90.51	427.08	1093.41
6.	EST CONS FOR PERIOD 1/78-3/78	3305.65	87.88	429.28	1143.63
7.	PRED CONS/ EST CONS LAST YR	0.92	0.95	0.91	0.88
8.	LOWER BOUND/ EST CONS LAST YR	0.81	0.87	0.82	0.79
	UPPER BOUND/ EST CONS LAST YR	1.02	1.03	0.99	0.96
9.	PRED CONSUMPTION FOR SEASON 1978-1979	6510.91	183.20	815.36	2134.38
10.	80% CONF INTERVAL FOR SEASON	6010.02	172.67	759.27	1990.30
		6992.50	193.74	871.46	2271.08
11.	EST CONSUMPTION FOR SEASON 1977-1978	6727.45	181.49	870.53	2306.37
12.	SEASON PRED CONS/ EST CONS LAST YR	0.97	1.01	0.94	0.93
13.	LOWER BOUND/ EST CONS LAST YR	0.89	0.95	0.87	0.86
	UPPER BOUND/ EST CONS LAST YR	1.04	1.07	1.00	0.98

NEN - New England, MAT - Mid Atlanta, ENC - East North Central
Other divisions not shown due to space limitations; West North Central, South Atlanta, East South Central, Mountain, Pacific

Figure 13. - Missouri weekly natural gas sendout and heating degree days, (Sept. 1973-May 1974 & Sept. 1974-Dec. 1974)



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Appendix 1 - Formulas and Derivations

As is explained in the text, both heating and cooling degree days are calculatd as the difference between daily average temperature, T in ^{O}F, and the base 65^{O}F. Daily average temperature is calculated for the maximum and minimum temperatures in the day at each station.

$$T = \frac{Tmax + Tmin}{2}$$

where

Tmax - station maximum temperature in the day (^{O}F),
Tmin - station minimum temperature in the day (^{O}F),
T - station average temperature in the day (^{O}F).

Define

h = station heating degree days for the day
c = station cooling degree days for the day

If $T < 65^{O}$, then
$h = 65^{O} - T$
$c = 0$

If $T > 65^{O}$, then
$h = 0$
$c = T-65^{O}$

If $T = 65^{O}$, then
$h = 0$
$c = 0$

For a State the number of degree days in a day is the population weighted sum of the degree days at the stations in and around the State.

$$h_s = \sum_{i=1}^{n} w_i h_i \qquad (1)$$

$$c_s = \sum_{i=1}^{n} w_i c_i \qquad (2)$$

where

h_i = heating degree days at station i,

c_i = cooling degree days at station i,

w_i = population weight of station i,

h_s = heating degree days for State s,

c_s = cooling degree days for State s,

n = number of stations used.

Cumulative degree days are the sum of degree days from the start of the season.

$$H_k = \sum_{j=1}^{k} h_{sj}, \; h_{sj} \text{ is } h_s \text{ for jth day of season} \qquad (3)$$

$$C_k = \sum_{j=1}^{k} c_{sj}, \; c_{sj} \text{ is } c_s \text{ for jth day of season,} \qquad (4)$$

where

H_k = cumulative State heating degree days to day k,

C_k = cumulative State ccooling degree days to day k.

Normal cumulative State degree days are obtained by using the daily station normal values in equations (1) and (2) and then summing over the days in the period using equation (3) and (4). The period used for calculating normal values is 1941-1970.
Let

H_{nk} = normal cumulative State heating degree days to day k,

C_{nk} = normal cumulative State cooling degree days to day k.

The values of the normal cumulative degree days are presented in the tables for 10-day intervals and plotted in the graphs as the central curve.

The value of the upper and lower bounds of the 90 percent confidence interval around the normal cumulative degree days are determined by assuming that the distribution of the accumulated degree days on any day has a normal distribution. The mean and standard deviation of the accumulated degree days are estimated and the confidence interval established.

Cumulative degree days have been found to be normally distributed. The standard deviation of cumulative heating degree days (H_k or C_k) at day k is estimated by

$$S_{hk} = \left[\sum_{i=1}^{y} \frac{(H_k - H_{ki})^2}{y-1} \right]^{\frac{1}{2}}$$

y = number of years in the data set,
k = day of season through which the degree days have been accumulated,
$\bar{H}_k$ = mean of the data series of heating degree days from July 1 to

$$\text{day } k \text{ or } \bar{H}_k = \sum_{i=1}^{y} \frac{H_{ki}}{y}.$$

Data on State degree days have been compiled on a monthly basis by the National Climatic Center back to 1931 (1, 2). The most current year used was 1977 so $y = 45$. Using this data the standard deviations are estimated for the accumulated degree day at the end of each month, i.e., S_{hk} for $k = 31$ (end of July), 62 (end of August), 92 (end of September), ..., 365 (end of June). The intermediate value of accumulations standard deviations were interpolated from the monthly accumulated values.

The standard deviation of cooling degree days is defined the same as heating degree days and the values were estimated in the same way over the same years.

$$S_{ck} = \sum_{i=1}^{y} \frac{(C_k - C_{ki})^2}{y-1}$$

where

y = years in the data set = 46,
k = days in the accumulation (accumulations by month are $k = 31$, January; $k = 59$, February; $k = 90$, March; ...; $k = 365$, December; for other values of k, S_{hk} was determined by interpolation),

$\bar{C}_k$ = mean of the data series of cooling degree days from January 1

$$\text{to day } k \text{ or } \bar{C}_k = \sum_{i=1}^{y} \frac{C_{ki}}{y}.$$

Having calculated the necessary parameter to determine the bounds of a confidence interval we find from a table of the normal distribution that a 90% confidence interval has bounds of 1.645 standard deviation around the mean.

In order to be consistent with the NWS data, H_{nk}, normal heating degree days (1941-1970) were chosen as the center of the interval rather than H_k, the mean of all years in the data set. The bounds at day k are the following:

for heating degree days,
upper bound, $U_{hk} = H_{nk} + 1.645\ S_{hk}$,

lower bound, $L_{hk} = H_{nk} - 1.645\ S_{hk}$;

for cooling degree days,
upper bound, $U_{ck} = C_{nk} + 1.645\ S_{ck}$,

lower bound, $L_{ck} = C_{nk} - 1.645\ S_{ck}$;.

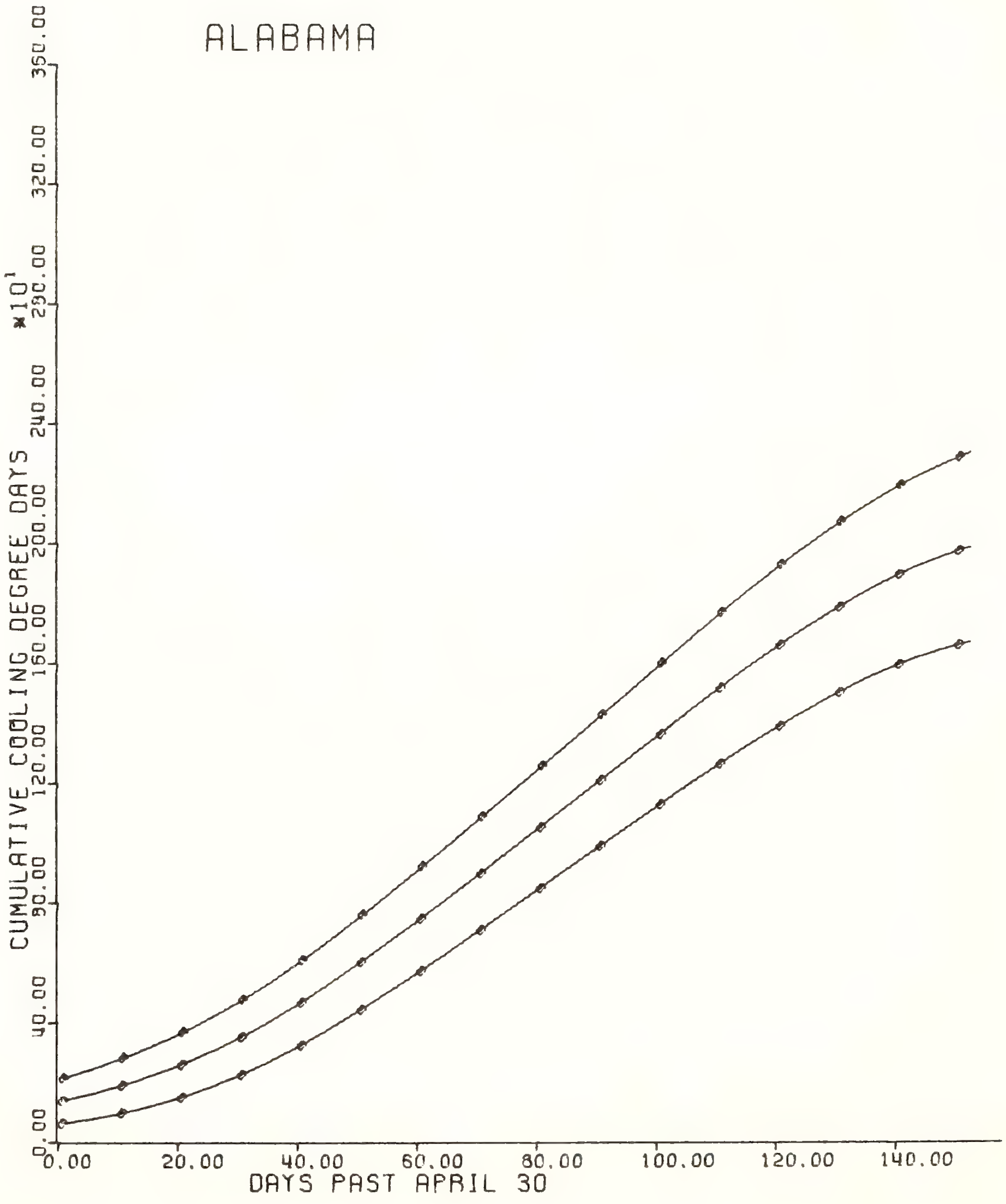
Degree days are defined only as positive numbers; if the values of L_{hk} or L_{ck} early in the season are less than zero they are set equal to zero.

Appendix 2 - Graphs and Tables of State Heating and Cooling Degree Days

ALABAMA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	94	185	276	55
20	146	253	360	65
30	219	343	467	76
40	316	456	596	86
50	432	589	746	96
60	559	733	907	106
70	696	885	1074	115
80	837	1040	1243	124
90	977	1195	1413	133
100	1115	1350	1585	143
110	1253	1504	1755	153
120	1380	1646	1916	164
130	1493	1777	2061	173
140	1588	1887	2186	182
150	1657	1970	2283	191
153	1672	1990	2308	194

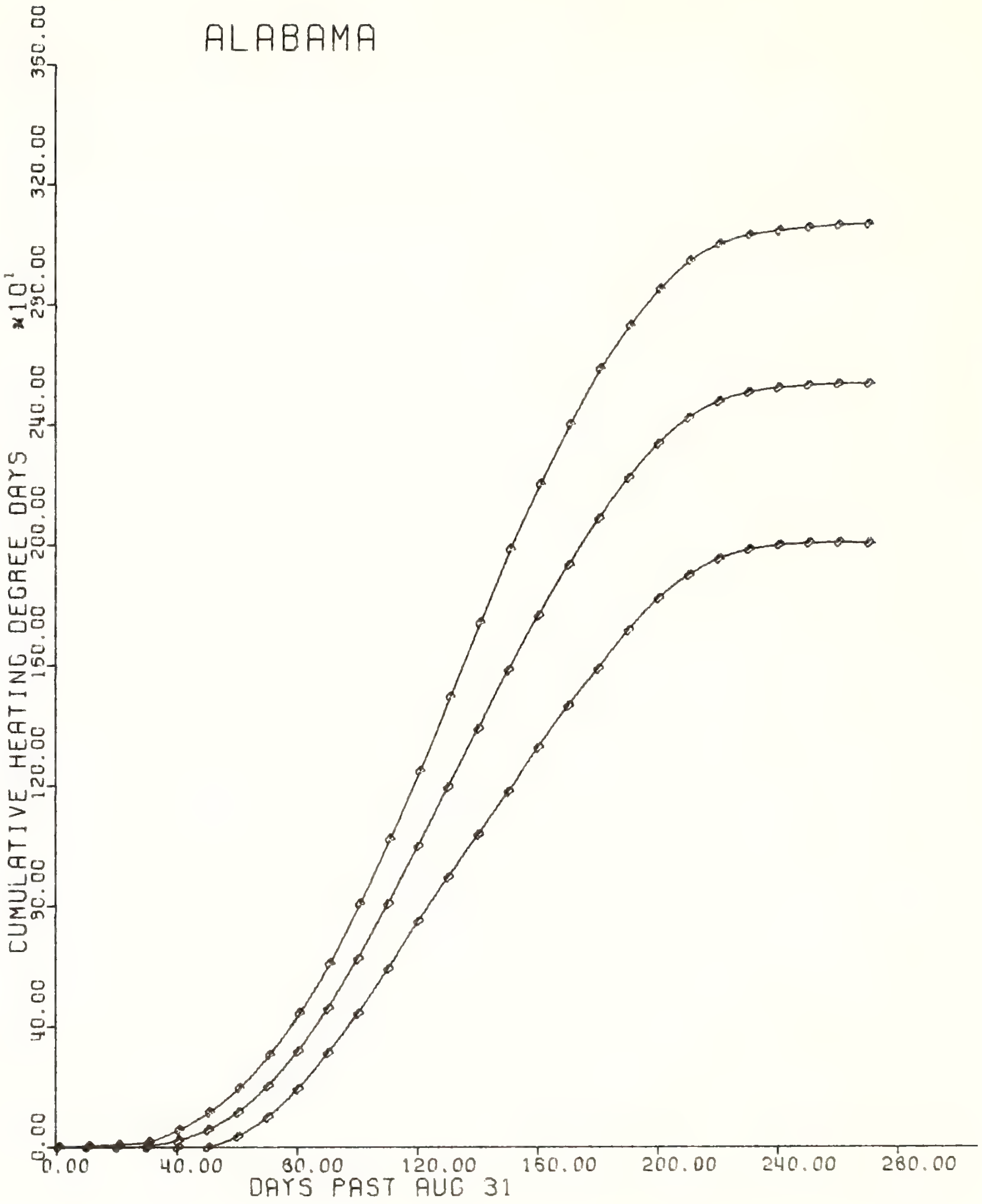
STATION	WEIGHT
BIRMINGHAM	.5825
MOBILE	.1093
MONTGOMERY	.3082



ALABAMA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	4	2
20	0	0	8	5
30	0	3	14	7
40	0	20	54	21
50	0	53	109	34
60	31	109	187	48
70	92	193	294	62
80	182	306	430	75
90	300	446	592	89
100	430	609	788	109
110	577	789	1001	129
120	734	980	1226	150
130	882	1176	1470	179
140	1025	1371	1717	211
150	1166	1564	1962	243
160	1313	1748	2183	265
170	1452	1918	2384	284
180	1577	2073	2569	303
190	1704	2211	2718	309
200	1813	2328	2843	314
210	1894	2417	2940	319
220	1951	2475	2999	320
230	1983	2507	3031	319
240	2000	2524	3048	319
250	2007	2533	3059	321
260	2010	2539	3068	322
270	2009	2540	3071	324
273	2008	2540	3072	325

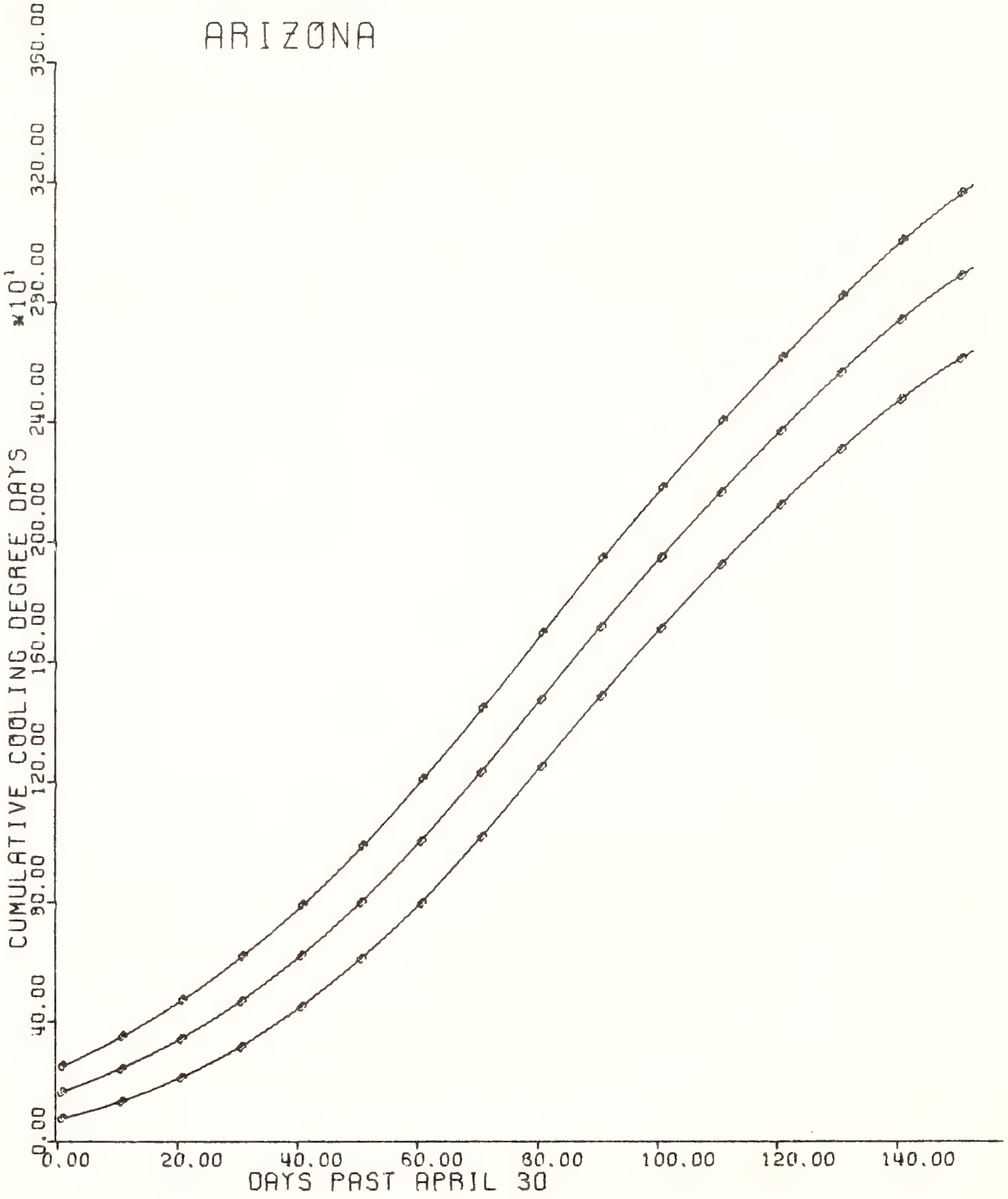
STATION	WEIGHT
BIRMINGHAM	.5825
MOBILE	.1093
MONTGOMERY	.3082



ARIZONA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	128	235	342	65
20	204	333	462	79
30	306	456	606	92
40	436	605	774	103
50	595	782	969	114
60	778	984	1190	126
70	996	1211	1426	131
80	1231	1453	1675	136
90	1466	1696	1926	140
100	1692	1928	2164	144
110	1906	2147	2388	147
120	2108	2354	2600	150
130	2295	2550	2805	156
140	2464	2729	2994	162
150	2604	2879	3154	168
153	2639	2918	3197	170

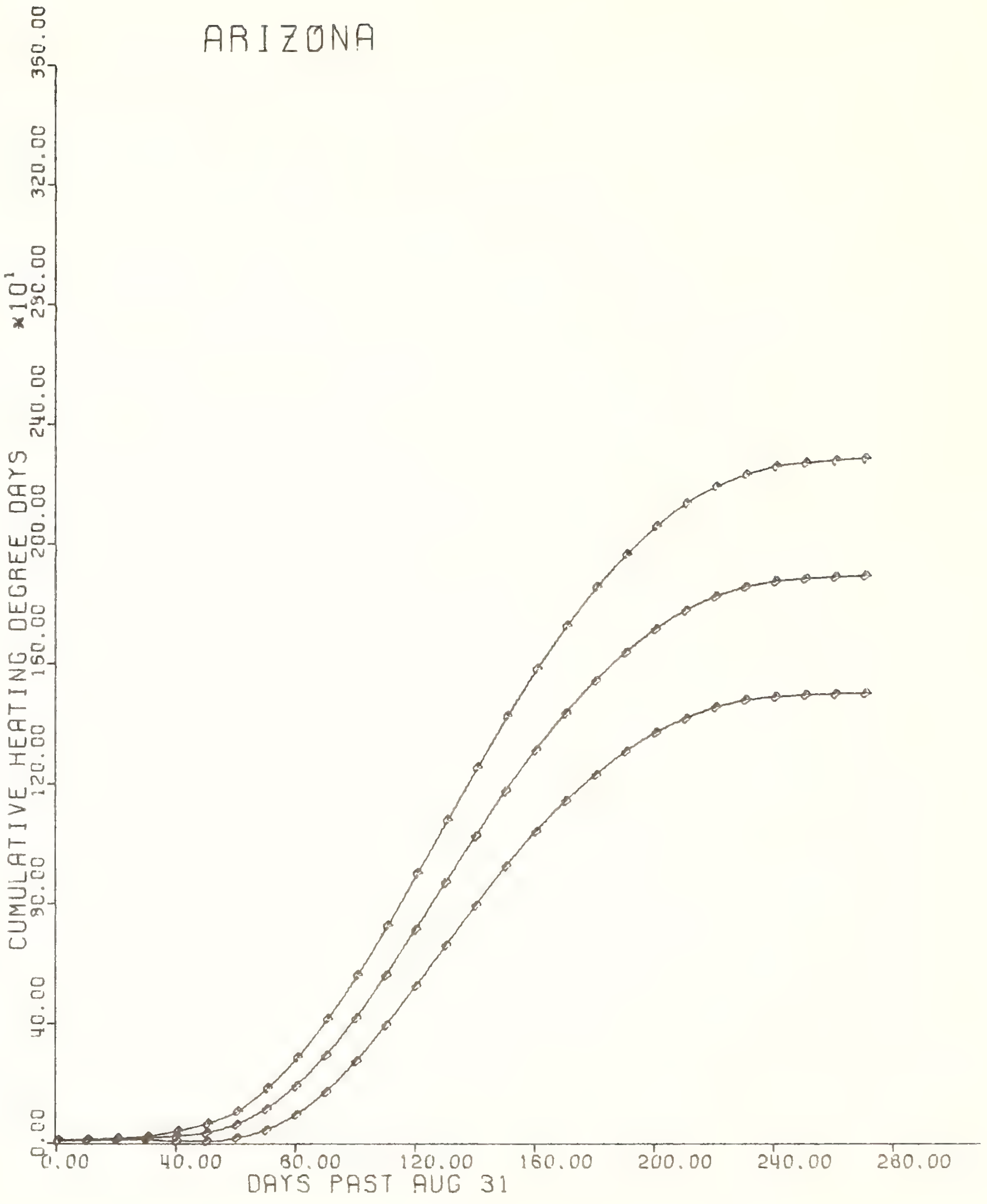
STATION	WEIGHT
LAS VEGAS, NV	.0147
FLAGSTAFF	.0271
PHOENIX	.6222
TUCSON	.2564
WINSLOW	.0452
YUMA	.0344



ARIZONA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	3	5	7	1
20	4	7	10	2
30	7	11	15	3
40	0	17	34	10
50	0	27	57	18
60	10	53	96	26
70	35	103	171	42
80	84	178	272	57
90	157	277	397	73
100	257	400	543	87
110	376	541	706	100
120	507	694	881	114
130	642	850	1058	127
140	778	1006	1234	139
150	909	1158	1407	152
160	1026	1296	1566	165
170	1129	1420	1711	177
180	1219	1531	1843	190
190	1297	1625	1953	200
200	1363	1706	2049	209
210	1411	1769	2127	219
220	1449	1817	2185	224
230	1475	1851	2227	229
240	1488	1872	2256	234
250	1493	1881	2269	236
260	1498	1888	2278	238
270	1500	1892	2284	239
273	1500	1893	2286	240

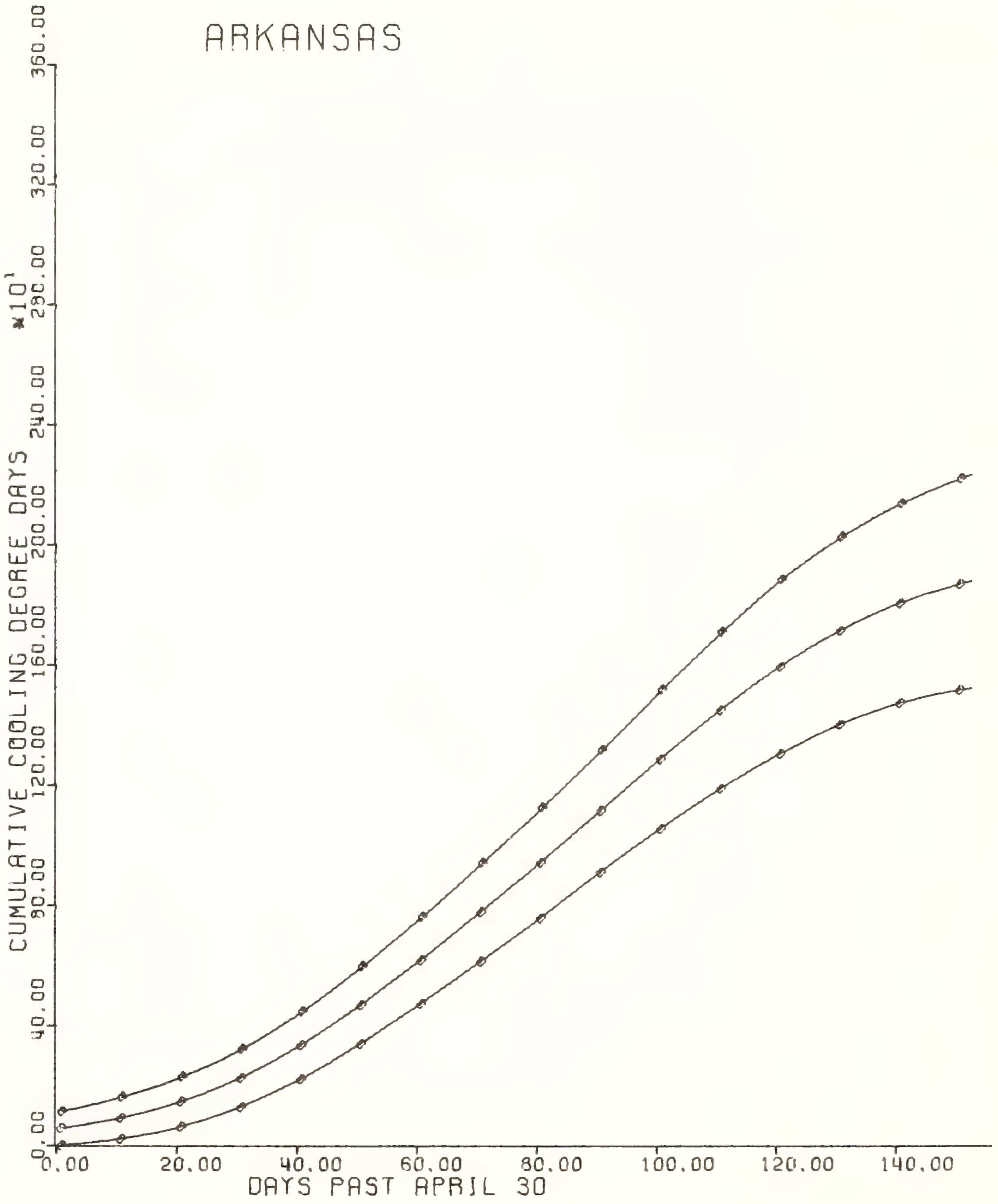
STATION	WEIGHT
LAS VEGAS, NV	.0147
FLAGSTAFF	.0271
PHOENIX	.6222
TUCSON	.2564
WINSLOW	.0452
YUMA	.0344



ARKANSAS
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	22	90	158	42
20	59	141	223	50
30	123	218	313	58
40	213	324	435	68
50	329	456	583	78
60	461	604	747	87
70	600	763	926	99
80	744	926	1108	111
90	897	1099	1301	123
100	1043	1272	1501	140
110	1178	1436	1694	158
120	1296	1584	1872	175
130	1396	1706	2016	189
140	1470	1801	2132	202
150	1516	1867	2218	214
153	1526	1883	2240	217

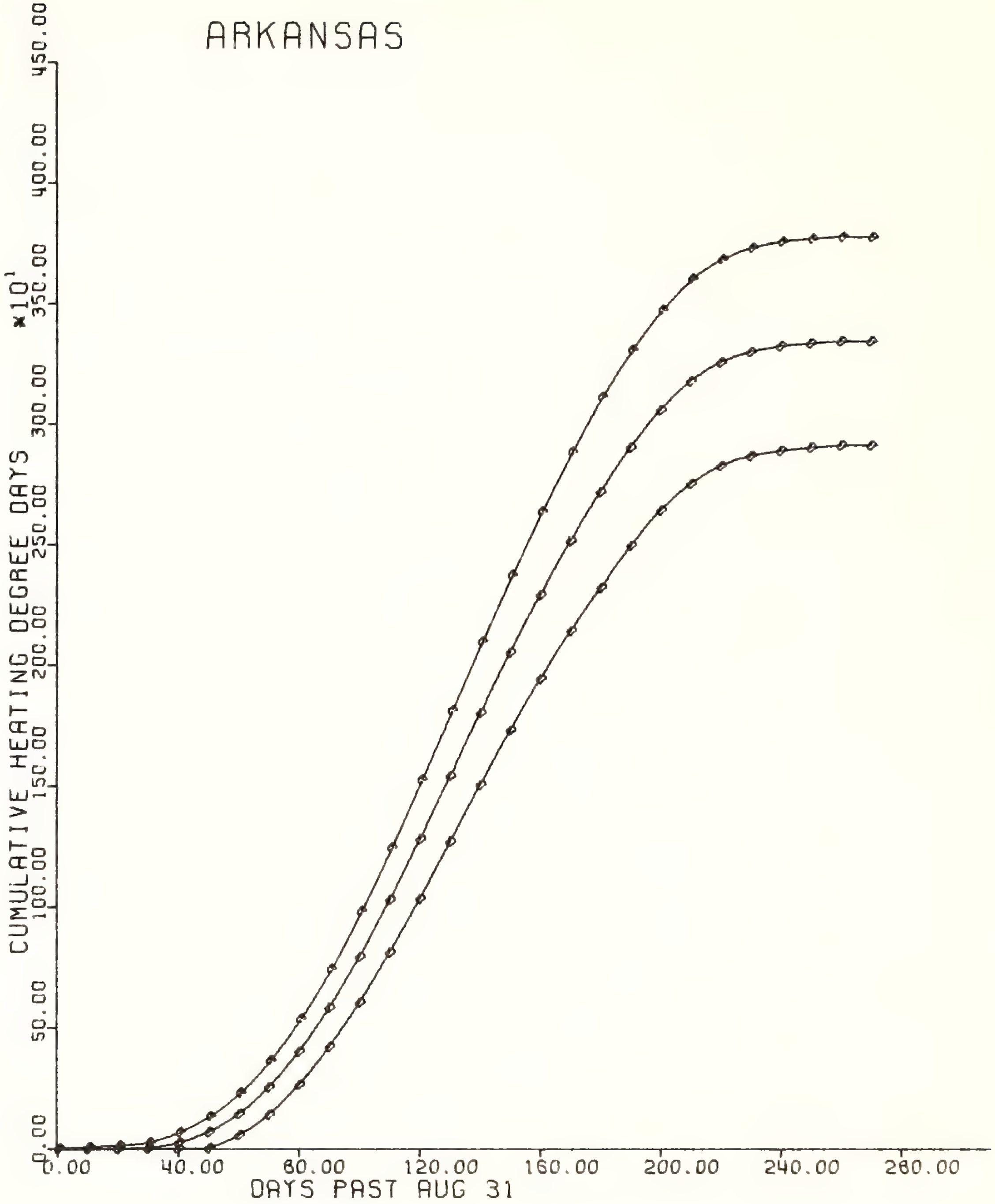
STATION	WEIGHT
FORT SMITH	.2582
LITTLE ROCK	.7418



ARKANSAS
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	8	5
20	0	0	14	9
30	0	4	24	12
40	0	23	65	26
50	1	65	129	39
60	50	136	222	53
70	131	242	353	68
80	252	387	522	83
90	405	565	725	97
100	587	775	963	115
110	793	1009	1225	132
120	1015	1259	1503	149
130	1249	1519	1789	165
140	1486	1781	2076	180
150	1712	2032	2352	195
160	1927	2272	2617	210
170	2126	2496	2866	225
180	2307	2702	3097	241
190	2483	2889	3295	248
200	2632	3048	3464	253
210	2747	3172	3597	259
220	2825	3254	3683	262
230	2869	3301	3733	263
240	2892	3326	3760	265
250	2905	3339	3773	265
260	2916	3349	3782	264
270	2917	3349	3761	263
273	2917	3349	3761	263

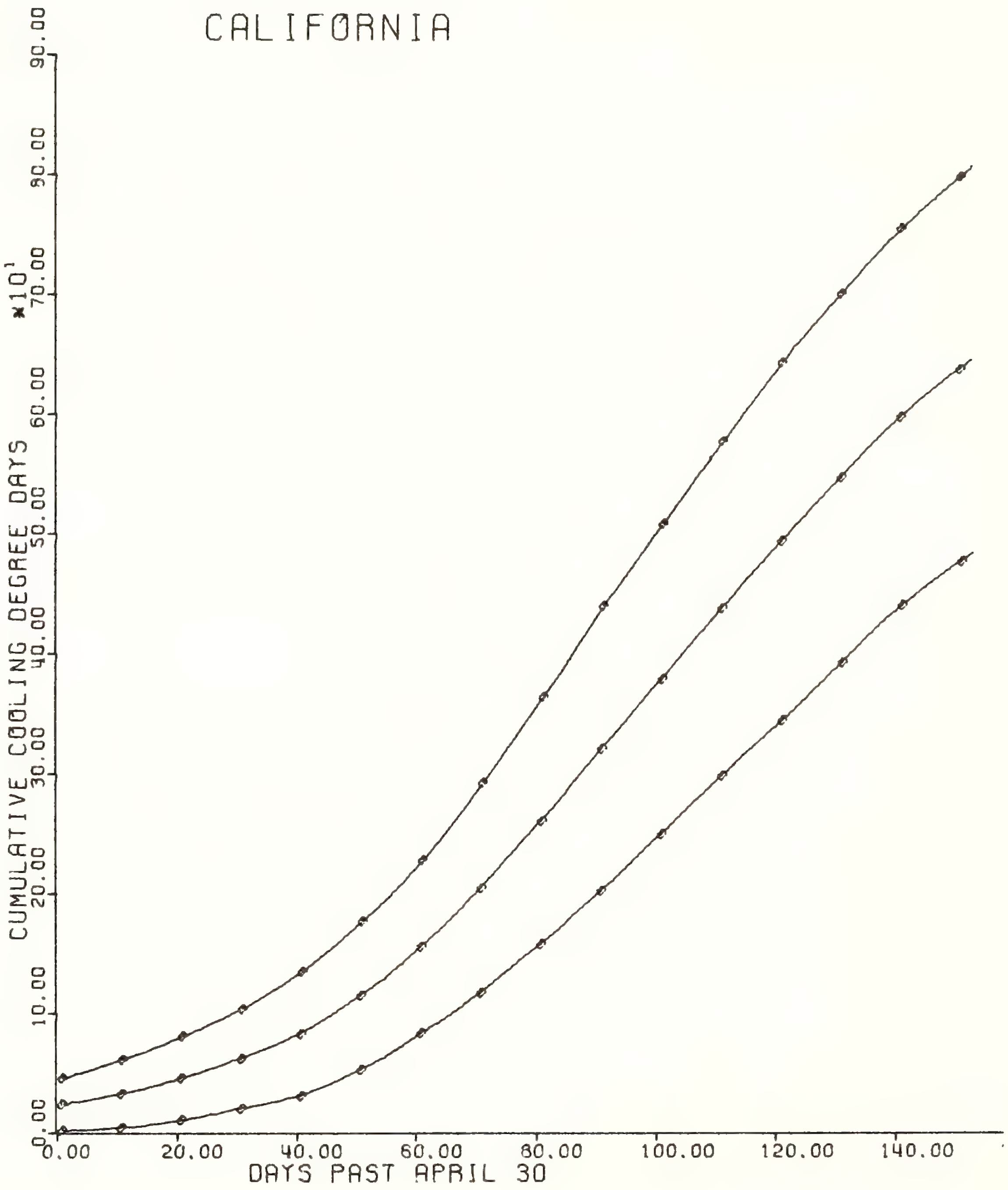
STATION	WEIGHT
FORT SMITH	.2582
LITTLE ROCK	.7418



CALIFORNIA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	4	32	60	17
20	10	44	78	21
30	20	61	102	25
40	30	81	132	31
50	51	112	173	37
60	80	151	222	44
70	114	200	286	53
80	154	256	358	62
90	198	315	432	71
100	246	374	502	78
110	294	432	570	84
120	340	488	636	90
130	388	542	696	94
140	436	593	750	96
150	474	635	796	98
153	484	646	808	99

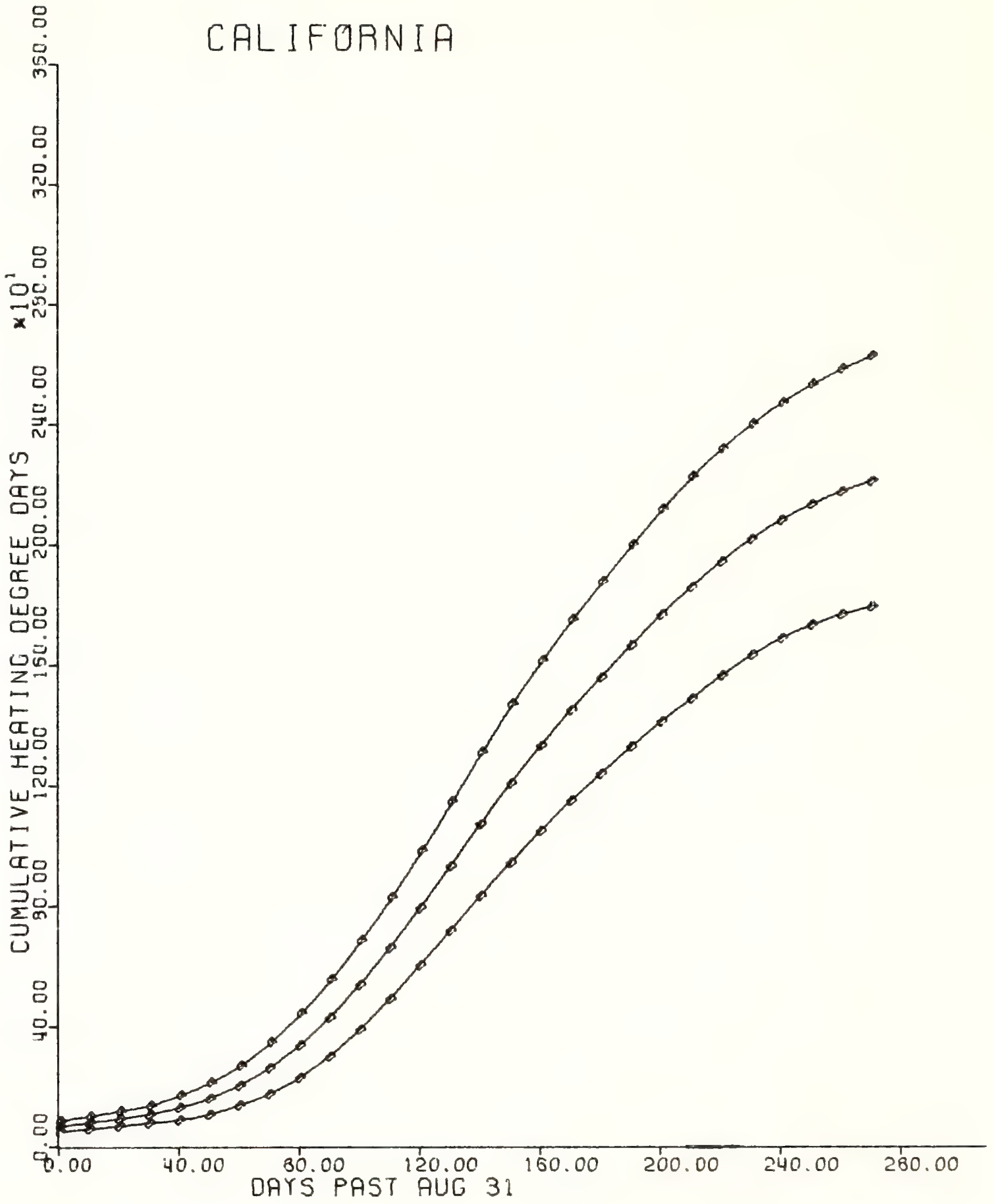
STATION	WEIGHT
YUMA, AZ	.0082
BAKERSFIELD	.0182
EUREKA	.0337
FRESNO	.0364
LOS ANGELES	.4993
RED BLUFF	.0679
SAN DIEGO	.0683
SAN FRANCISCO	.2208
STOCKTON	.0364
LAS VEGAS, NV	.0094
RENO, NV	.0014



CALIFORNIA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	62	82	102	12
20	70	94	118	15
30	81	109	137	17
40	90	130	170	24
50	108	160	212	32
60	137	201	265	39
70	173	257	341	51
80	225	330	435	64
90	295	421	547	77
100	382	529	676	89
110	483	651	819	102
120	596	784	972	115
130	711	923	1135	129
140	826	1063	1300	144
150	938	1199	1460	159
160	1044	1325	1606	171
170	1144	1443	1742	182
180	1236	1553	1870	193
190	1325	1659	1993	204
200	1410	1761	2112	214
210	1486	1854	2222	224
220	1564	1941	2318	230
230	1633	2017	2401	234
240	1690	2082	2474	239
250	1735	2135	2535	244
260	1772	2180	2588	249
270	1798	2215	2632	254
273	1805	2224	2643	256

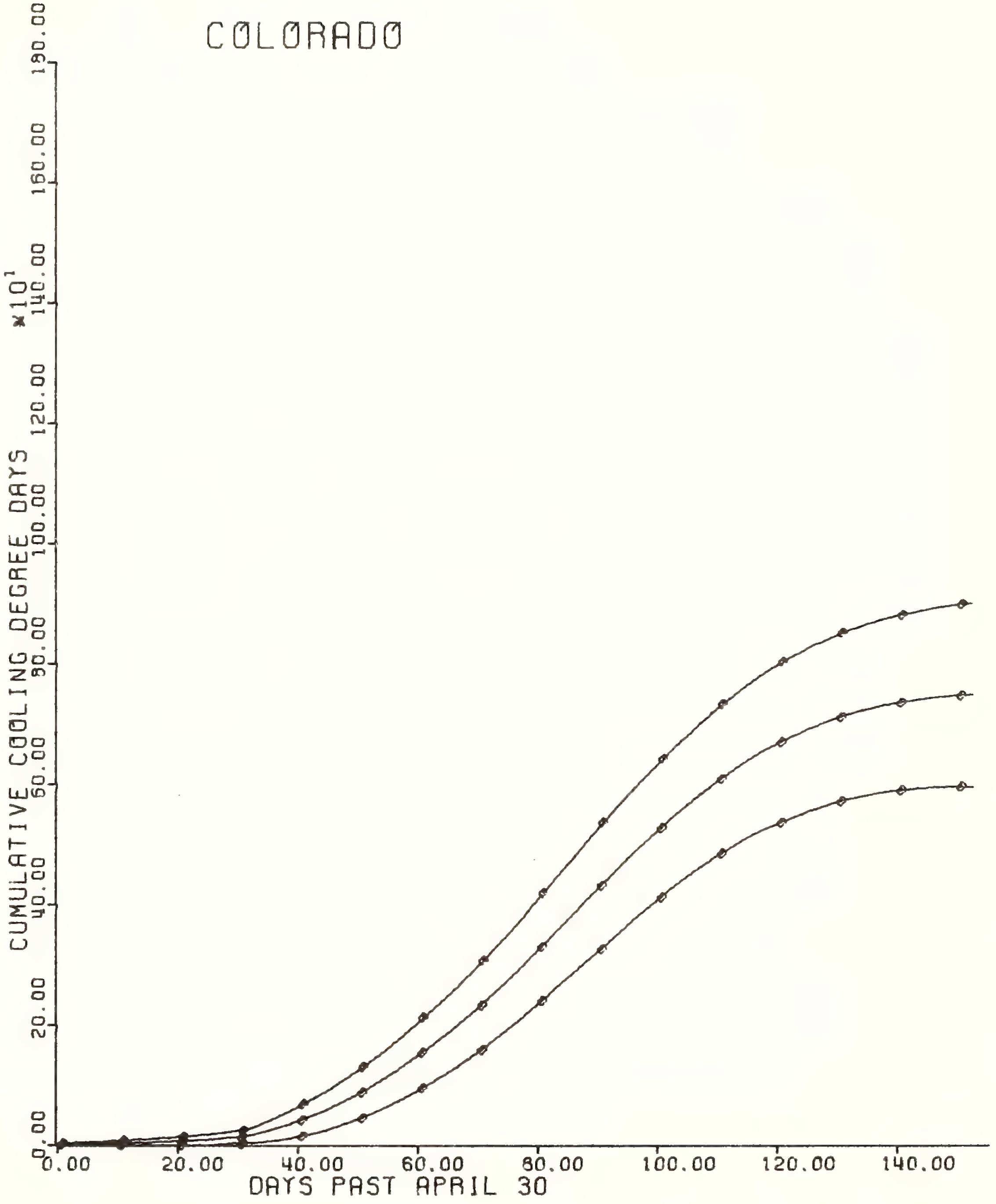
STATION	WEIGHT
YUMA, AZ	.0082
BAKERSFIELD	.0182
EUREKA	.0337
FRESNO	.0364
LOS ANGELES	.4993
RED BLUFF	.0679
SAN DIEGO	.0683
SAN FRANCISCO	.2208
STOCKTON	.0364
LAS VEGAS, NV	.0094
RENO, NV	.0014



COLORADO
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	4	8	2
20	0	7	14	4
30	4	14	24	6
40	14	39	64	15
50	42	83	124	25
60	89	146	203	35
70	152	225	298	44
80	232	320	408	54
90	318	422	526	63
100	405	519	633	70
110	480	603	726	75
120	533	666	799	81
130	571	710	849	85
140	591	736	881	89
150	598	749	900	92
153	597	750	903	93

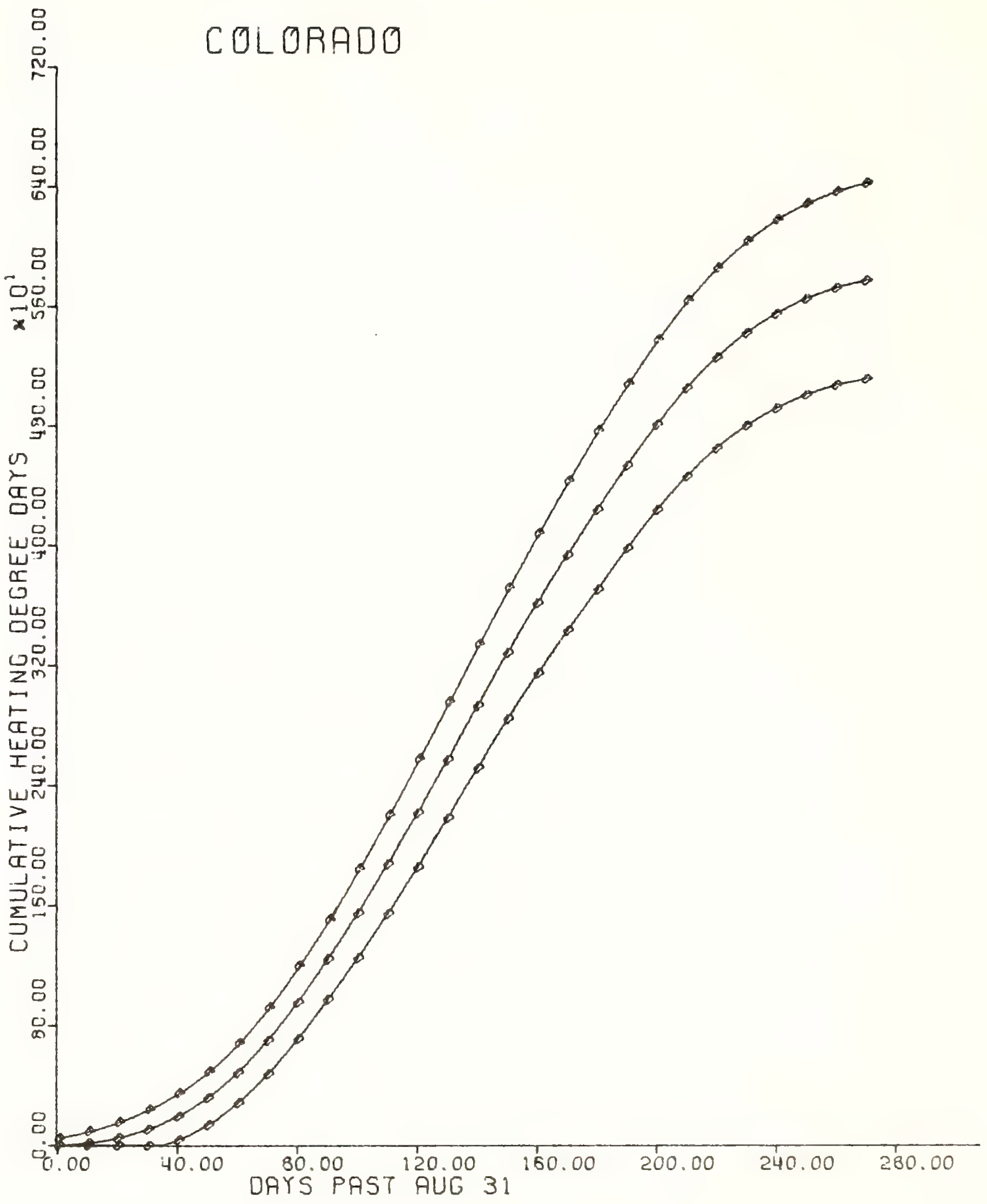
STATION	WEIGHT
GOODLAND, KS	.0144
DENVER	.6815
GRAND JUNCTION	.1029
PUEBLO	.2012



COLORADO
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	15	90	46
20	0	46	150	63
30	0	101	234	81
40	29	184	339	94
50	126	303	480	108
60	267	466	665	121
70	456	677	898	135
80	687	930	1173	148
90	949	1214	1479	162
100	1225	1520	1815	180
110	1519	1846	2173	199
120	1828	2186	2544	218
130	2155	2540	2925	235
140	2490	2900	3310	250
150	2816	3252	3688	266
160	3122	3588	4054	284
170	3410	3907	4404	303
180	3685	4214	4743	323
190	3961	4510	5059	335
200	4220	4768	5356	347
210	4447	5035	5623	358
220	4640	5243	5846	367
230	4795	5412	6029	376
240	4914	5545	6176	385
250	5008	5648	6288	390
260	5077	5724	6371	395
270	5120	5775	6430	400
273	5129	5787	6445	401

STATION	WEIGHT
GOODLAND, KS	.0144
DENVER	.6815
GRAND JUNCTION	.1029
PUEBLO	.2012

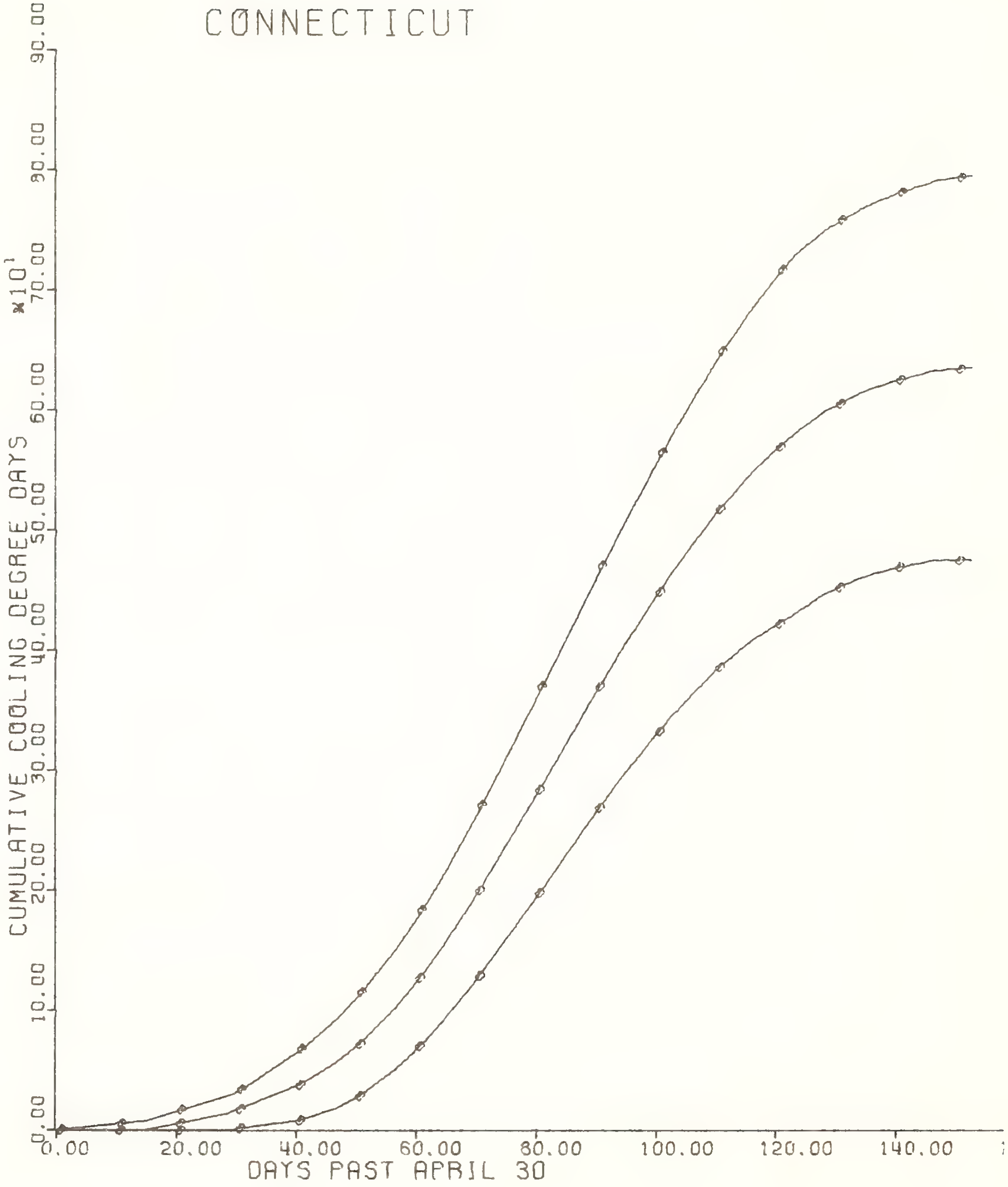


CONNECTICUT
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	5	3
20	0	5	15	6
30	0	16	32	10
40	8	36	64	17
50	26	68	110	26
60	65	120	175	34
70	122	192	262	43
80	190	275	360	52
90	262	361	460	61
100	327	442	557	70
110	382	512	642	79
120	420	566	712	89
130	450	603	756	93
140	469	625	781	95
150	476	635	794	97
153	476	636	796	98

STATION	WEIGHT
BRIDGEPORT	.3592
HARTFORD	.6408

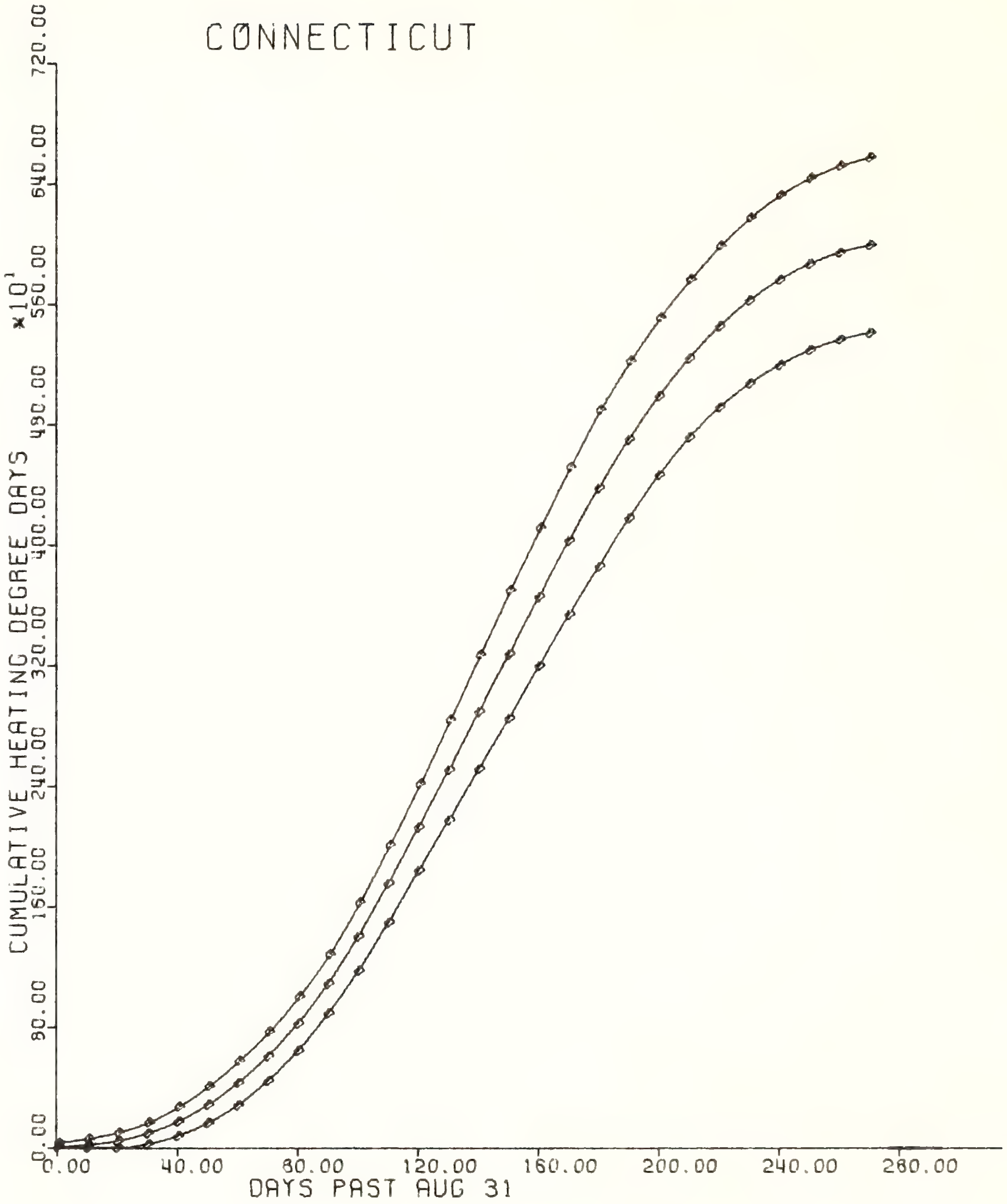
CONNECTICUT



CONNECTICUT
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	18	57	24
20	0	44	99	33
30	21	91	161	43
40	70	166	262	58
50	153	274	395	74
60	268	414	560	89
70	425	589	753	100
80	622	802	982	110
90	866	1062	1258	120
100	1147	1372	1597	137
110	1465	1721	1977	156
120	1808	2094	2380	174
130	2144	2473	2802	201
140	2482	2858	3234	229
150	2819	3241	3663	257
160	3165	3623	4081	279
170	3507	3996	4485	298
180	3830	4350	4870	317
190	4152	4676	5200	320
200	4443	4968	5493	320
210	4698	5224	5750	321
220	4902	5439	5976	328
230	5065	5616	6167	336
240	5192	5757	6322	345
250	5294	5866	6438	349
260	5367	5945	6523	353
270	5413	5997	6581	356
273	5421	6007	6593	357

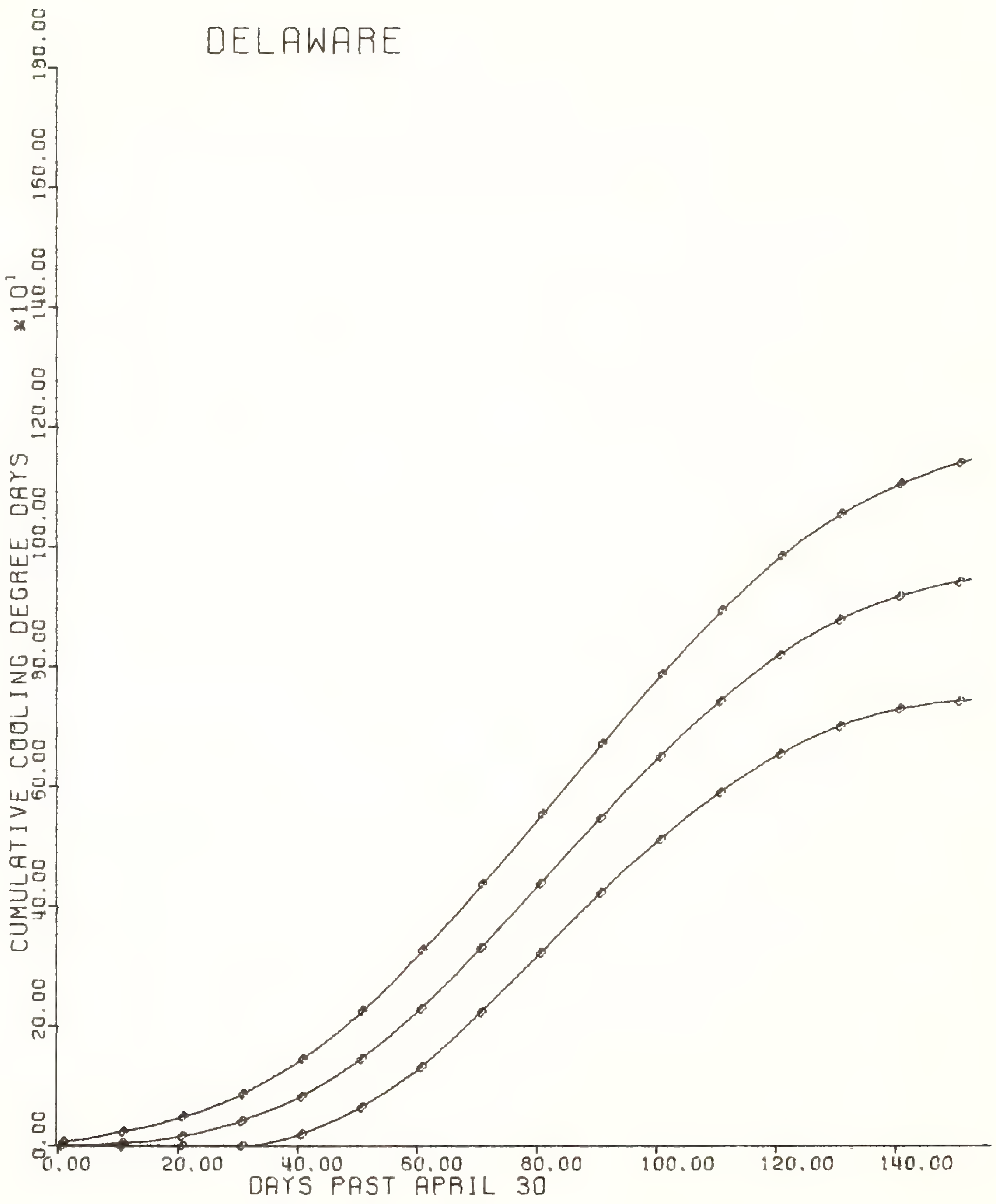
STATION	WEIGHT
BRIDGEPORT	.3592
HARTFORD	.6408



DELAWARE
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	4	22	11
20	0	14	45	19
30	0	37	81	27
40	16	77	138	37
50	56	137	216	48
60	123	219	315	59
70	213	319	425	65
80	312	427	542	70
90	412	536	660	76
100	503	640	777	84
110	582	733	864	92
120	648	813	978	100
130	697	873	1049	108
140	728	915	1102	114
150	743	941	1139	121
153	744	946	1148	123

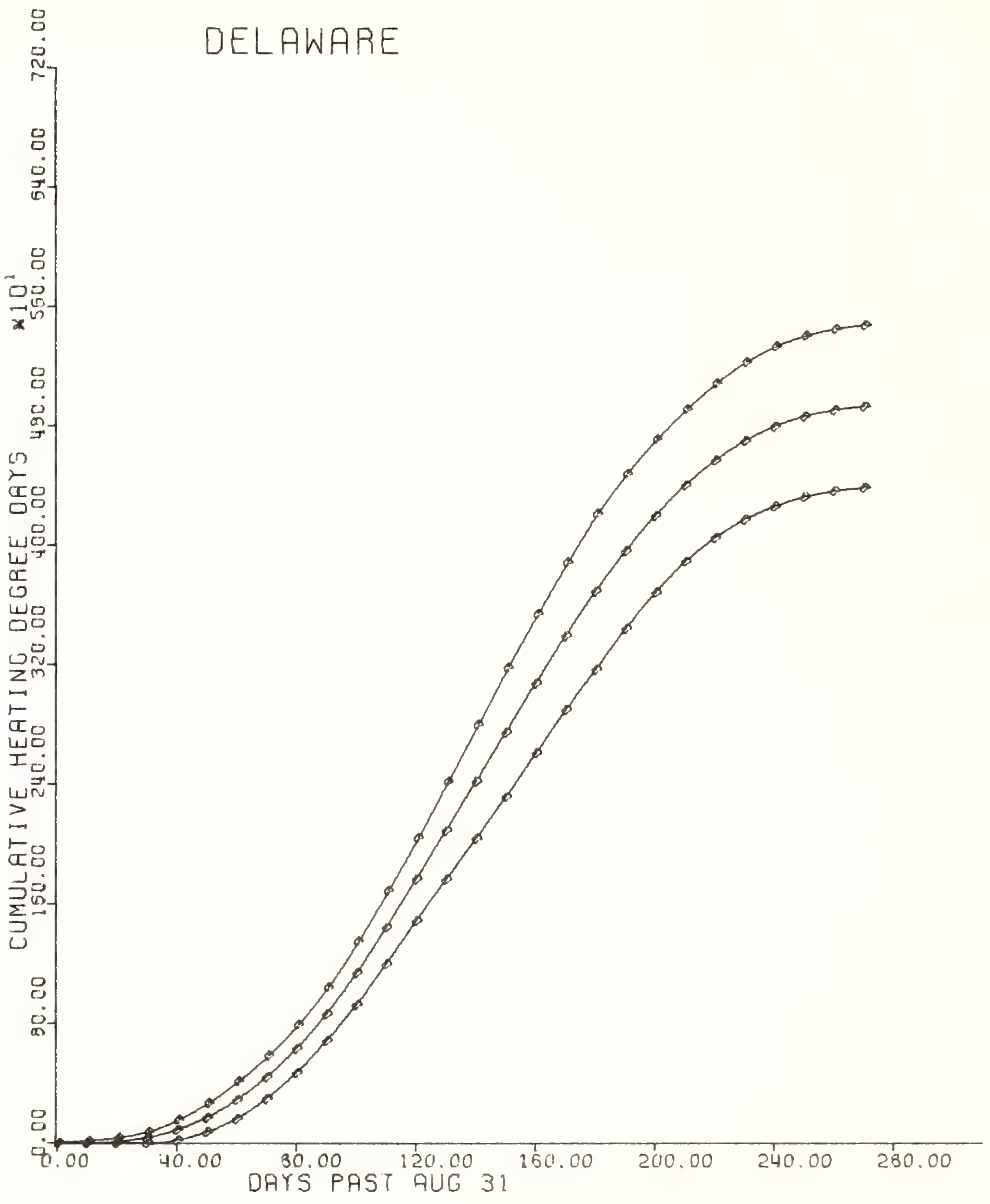
STATION	WEIGHT
ATLANTIC CITY, NJ	.2956
WILMINGTON	.7044



DELAWARE
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	13	8
20	0	8	33	15
30	0	33	70	23
40	16	82	148	40
50	67	162	257	58
60	152	276	400	75
70	282	425	568	87
80	452	612	772	98
90	663	841	1019	109
100	903	1112	1321	128
110	1172	1414	1656	148
120	1461	1736	2011	168
130	1740	2063	2386	197
140	2015	2390	2765	228
150	2292	2719	3146	260
160	2584	3046	3508	282
170	2874	3365	3856	300
180	3145	3665	4185	317
190	3419	3938	4457	317
200	3665	4180	4695	314
210	3876	4387	4898	312
220	4039	4557	5075	316
230	4167	4694	5221	321
240	4258	4794	5330	327
250	4324	4864	5404	329
260	4368	4910	5452	330
270	4391	4935	5479	332
273	4394	4939	5484	332

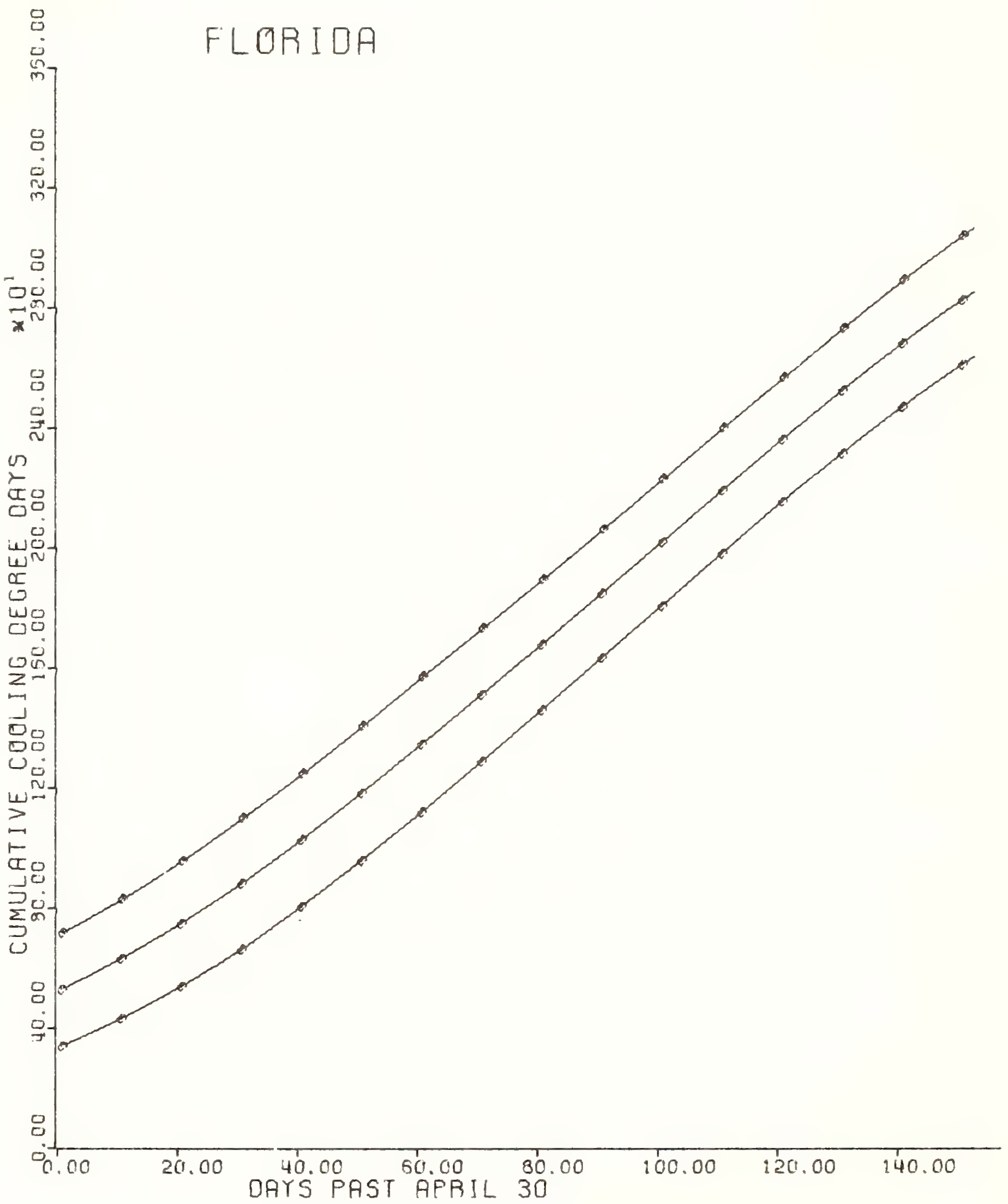
STATION	WEIGHT
ATLANTIC CITY, NJ	.2956
WILMINGTON	.7044



FLORIDA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	423	621	819	121
20	529	737	945	127
30	649	868	1067	133
40	791	1013	1235	135
50	944	1168	1392	137
60	1104	1330	1556	138
70	1272	1495	1718	136
80	1443	1662	1881	133
90	1617	1832	2047	131
100	1792	2004	2216	129
110	1966	2176	2386	128
120	2140	2347	2554	126
130	2302	2511	2720	127
140	2458	2670	2882	129
150	2601	2816	3031	131
153	2641	2857	3073	132

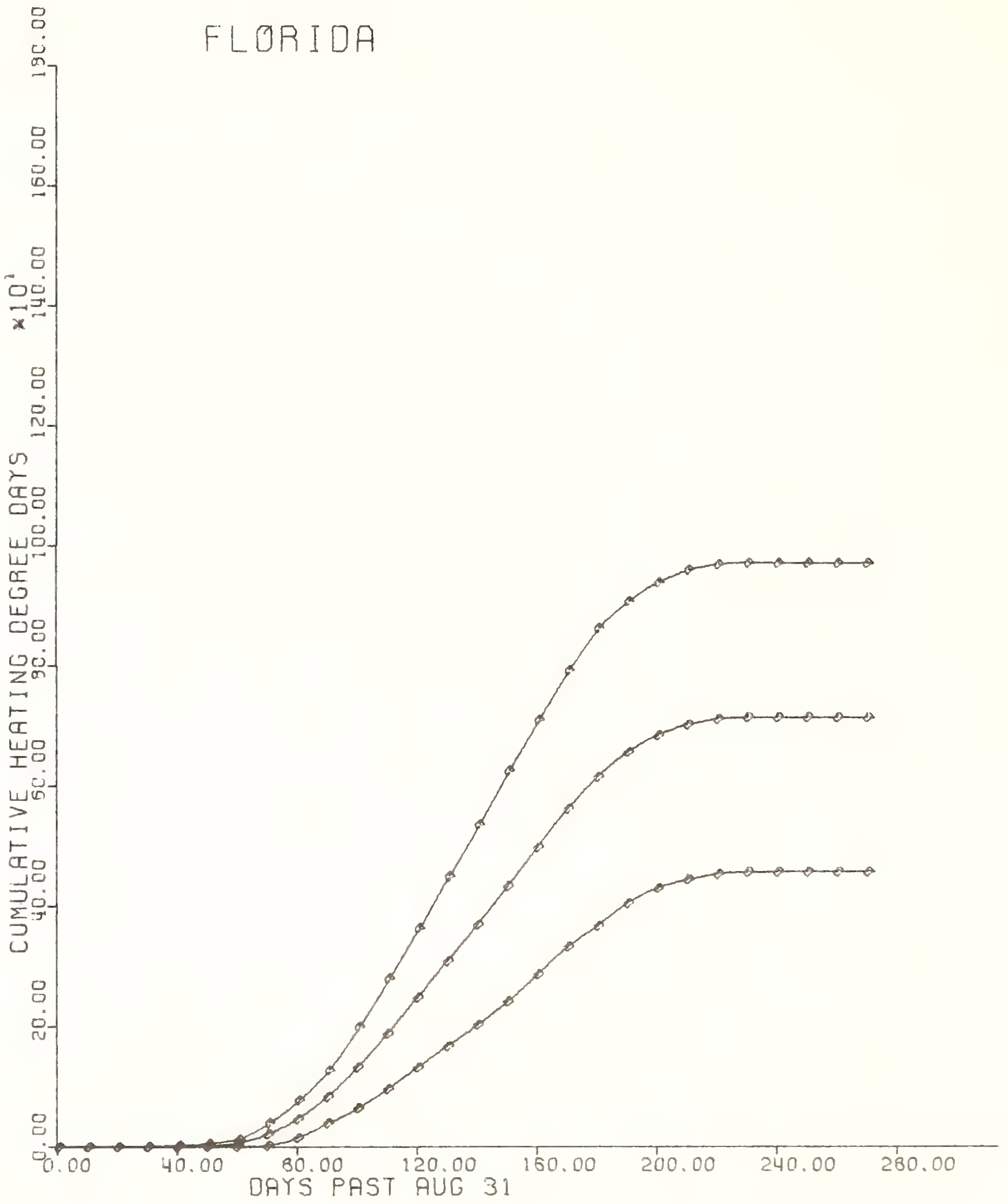
STATION	WEIGHT
MOBILE, AL	.0488
APALACHICOLA	.0025
DAYTONA BEACH	.0411
FT. MYERS	.0339
JACKSONVILLE	.1311
KEY WEST	.0075
LAKELAND	.0779
MIAMI	.2750
ORLANDO	.0657
TALLAHASSEE	.0467
TAMPA	.1975
WEST PALM BEACH	.0523



FLORIDA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	0	0
20	0	0	0	0
30	0	0	0	0
40	0	0	2	1
50	0	1	5	2
60	0	5	11	4
70	1	19	37	11
80	13	43	73	18
90	36	79	122	26
100	60	126	192	40
110	92	182	272	55
120	128	242	356	69
130	165	304	443	85
140	200	364	528	100
150	237	427	617	116
160	283	493	703	128
170	329	557	785	139
180	365	611	857	150
190	403	654	905	153
200	429	683	937	155
210	445	702	959	157
220	454	712	970	157
230	458	715	972	157
240	458	715	972	157
250	458	715	972	157
260	458	715	972	157
270	458	715	972	157
273	458	715	972	157

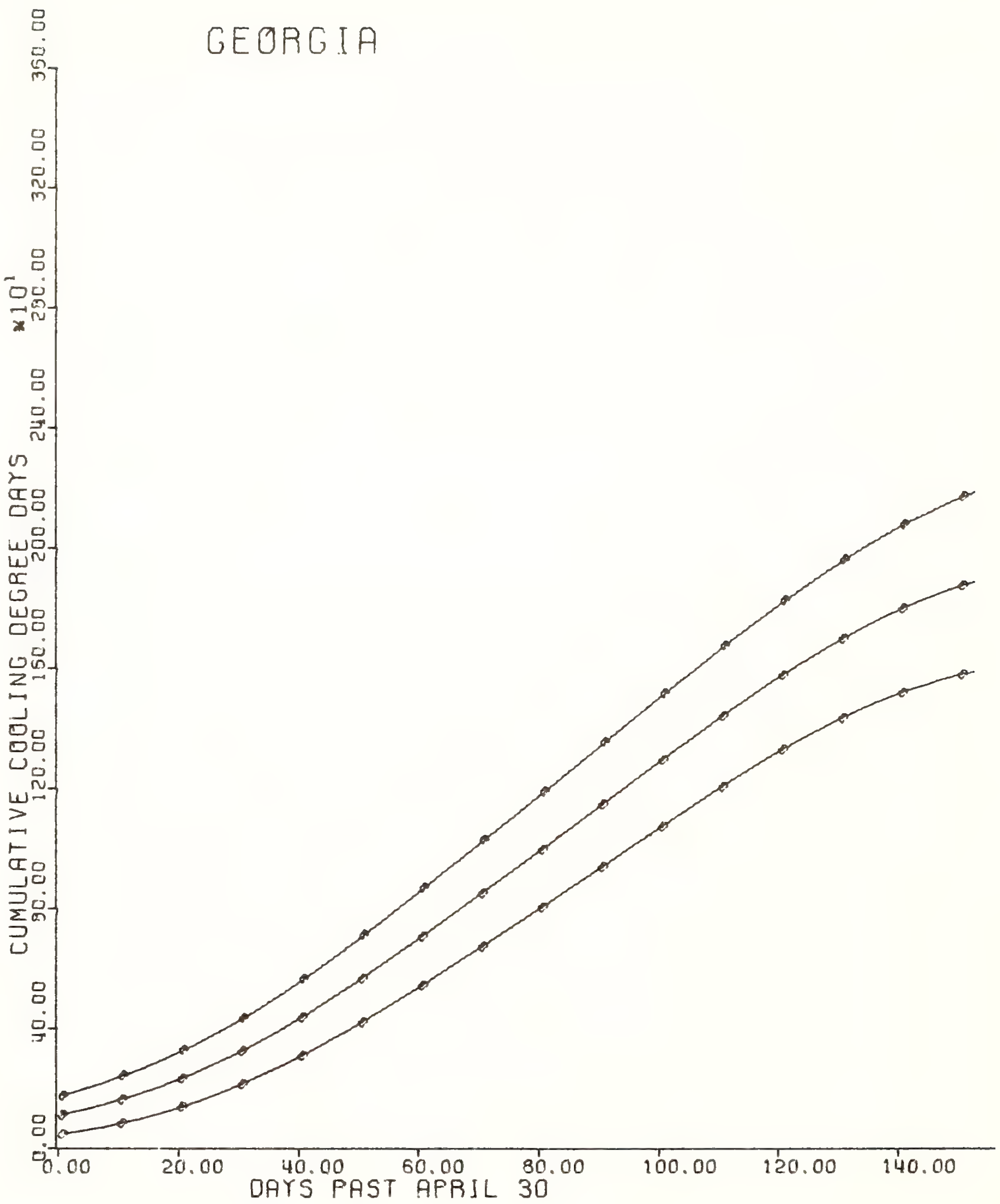
STATION	WEIGHT
MOBILE, AL	.0488
APALACHICOLA	.0025
DAYTONA BEACH	.0411
FT. MYERS	.0339
JACKSONVILLE	.1311
KEY WEST	.0075
LAKELAND	.0779
MIAMI	.2750
ORLANDO	.0857
TALLAHASSEE	.0467
TAMPA	.1975
WEST PALM BEACH	.0523



GEORGIA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	80	158	236	48
20	132	226	320	57
30	206	315	424	66
40	299	426	553	77
50	409	553	697	88
60	531	693	855	99
70	661	838	1015	108
80	792	984	1176	117
90	926	1133	1340	127
100	1062	1263	1504	135
110	1195	1429	1663	143
120	1320	1567	1814	151
130	1427	1690	1953	160
140	1514	1793	2072	170
150	1578	1873	2168	180
153	1591	1891	2191	183

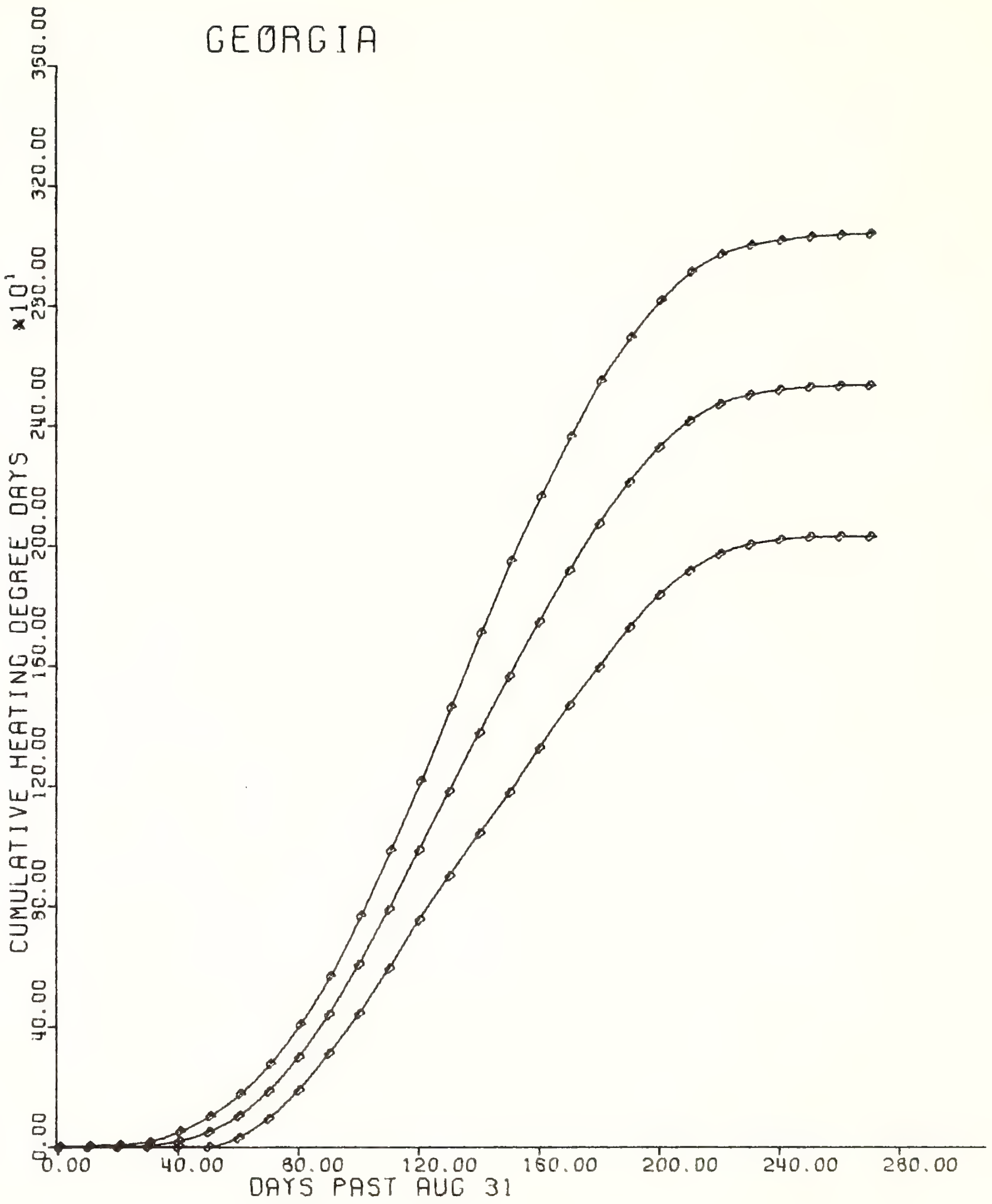
STATION	WEIGHT
TALLAHASSEE, FL	.1272
ATLANTA	.4558
AUGUSTA	.0730
MACON	.2523
SAVANNAH	.0917



GEORGIA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	4	2
20	0	0	7	4
30	0	4	15	7
40	0	18	49	19
50	0	46	97	31
60	26	97	168	44
70	87	177	267	55
80	178	287	396	67
90	297	425	553	78
100	430	590	750	98
110	580	774	968	118
120	740	968	1196	139
130	888	1165	1442	169
140	1031	1360	1689	201
150	1167	1548	1929	233
160	1314	1731	2148	255
170	1457	1903	2349	272
180	1587	2062	2537	290
190	1718	2202	2686	295
200	1830	2321	2812	300
210	1912	2411	2910	304
220	1972	2472	2972	305
230	2006	2505	3004	305
240	2024	2523	3022	304
250	2032	2533	3034	305
260	2035	2538	3041	307
270	2035	2540	3045	308
273	2034	2540	3046	308

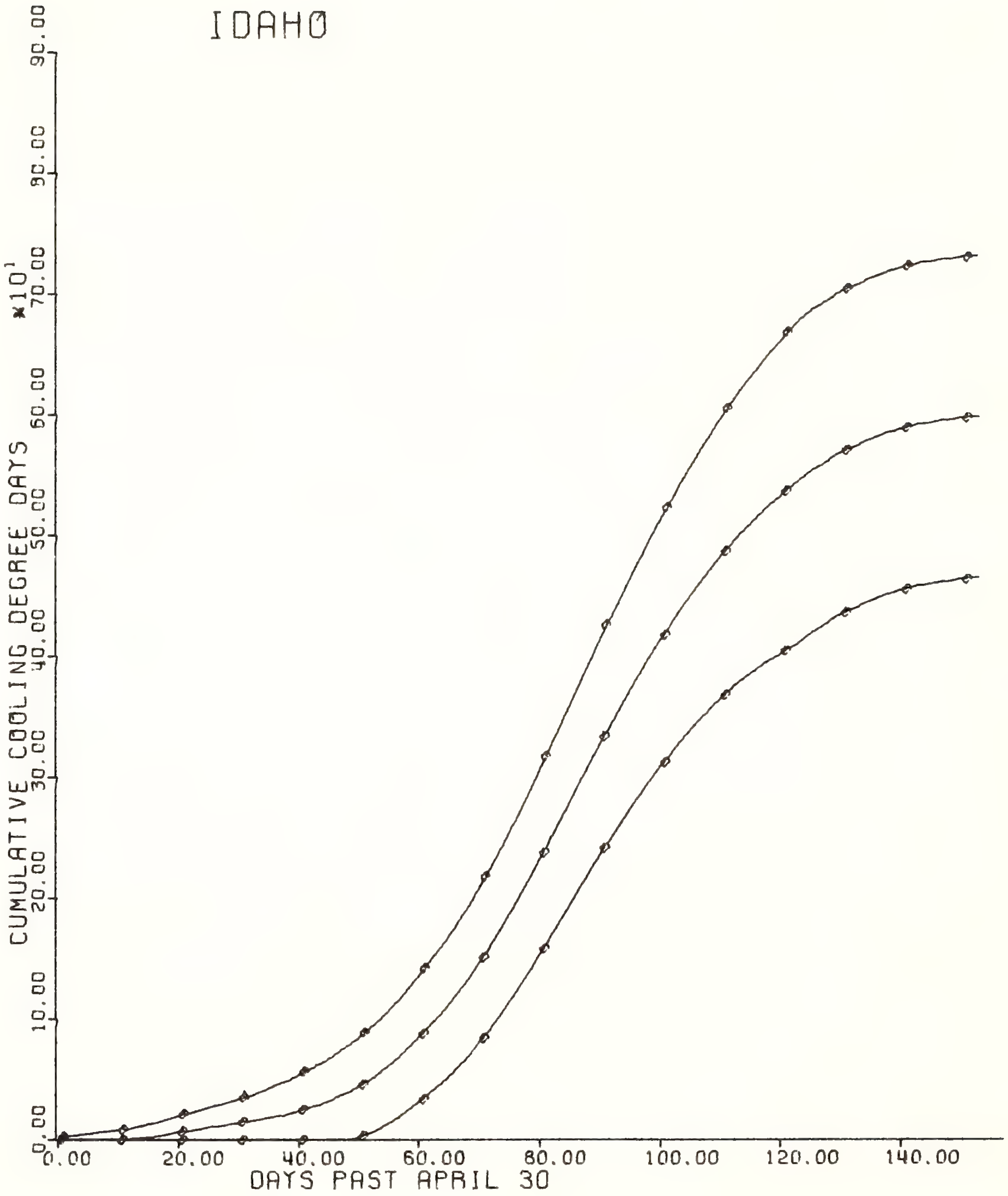
STATION	WEIGHT
TALLAHASSEE, FL	.1272
ATLANTA	.4558
AUGUSTA	.0730
MACON	.2523
SAVANNAH	.0917



IDAHO
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	8	5
20	0	6	20	8
30	0	14	34	12
40	0	23	53	19
50	1	43	85	25
60	30	83	136	32
70	78	144	210	40
80	151	229	307	48
90	233	324	415	55
100	307	411	515	64
110	364	481	598	72
120	401	532	663	80
130	435	569	703	82
140	455	589	723	82
150	465	598	731	81
153	466	599	732	81

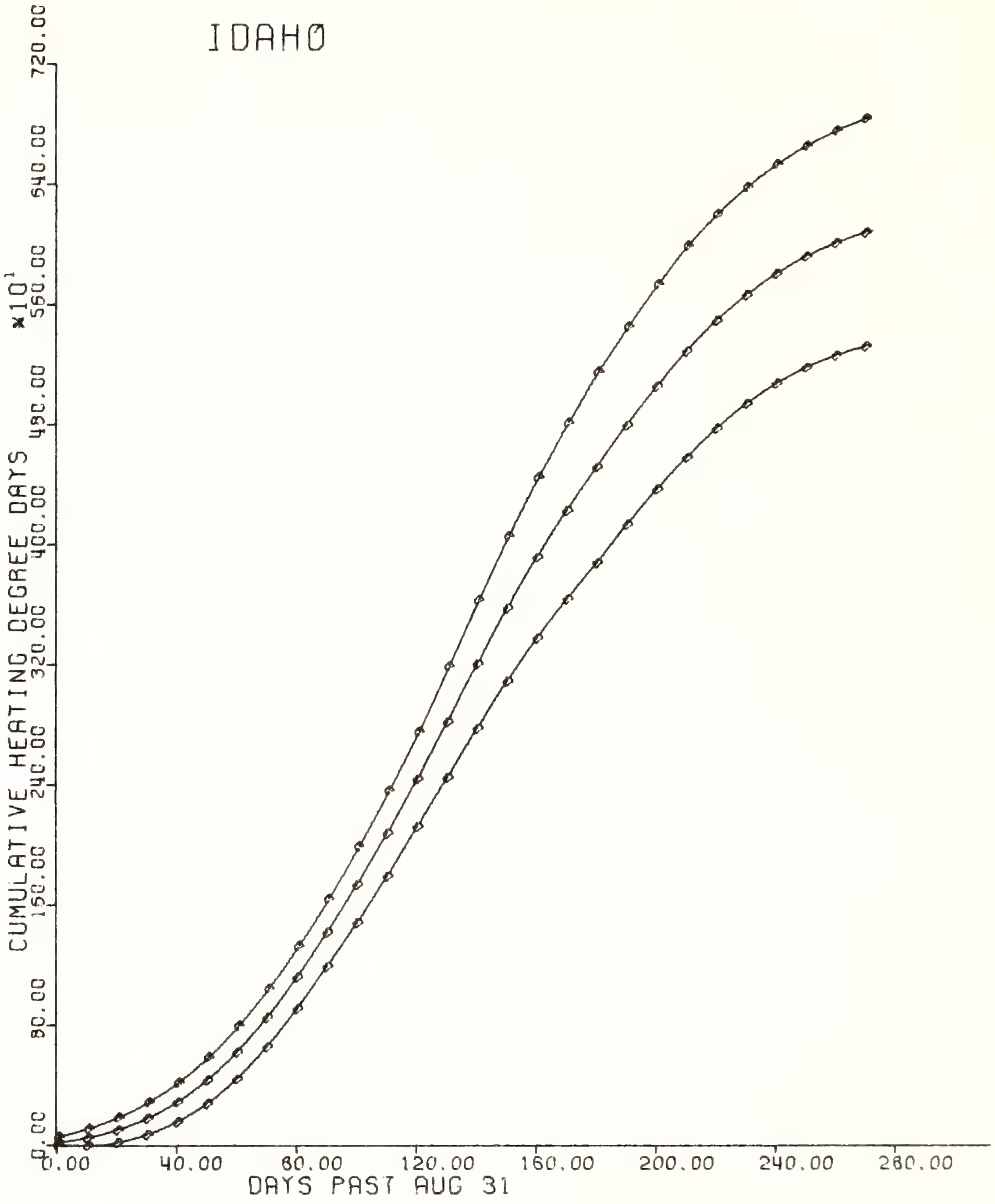
STATION	WEIGHT
MISSOULA, MT	.0407
BOISE	.4769
LEWISTON	.1851
POCATELLO	.2973



IDAHO
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	49	108	36
20	16	98	180	50
30	66	172	278	64
40	148	277	406	79
50	266	418	570	93
60	424	600	776	107
70	635	827	1019	117
80	884	1092	1300	127
90	1164	1388	1612	137
100	1454	1707	1960	154
110	1763	2046	2329	172
120	2093	2406	2719	191
130	2420	2764	3148	222
140	2749	3170	3591	257
150	3064	3542	4020	292
160	3354	3885	4416	324
170	3617	4199	4781	355
180	3859	4492	5125	386
190	4112	4771	5430	402
200	4350	5032	5714	416
210	4565	5270	5975	430
220	4761	5477	6193	436
230	4930	5653	6376	441
240	5069	5800	6531	446
250	5179	5919	6659	451
260	5262	6012	6762	457
270	5327	6086	6845	463
273	5343	6105	6867	465

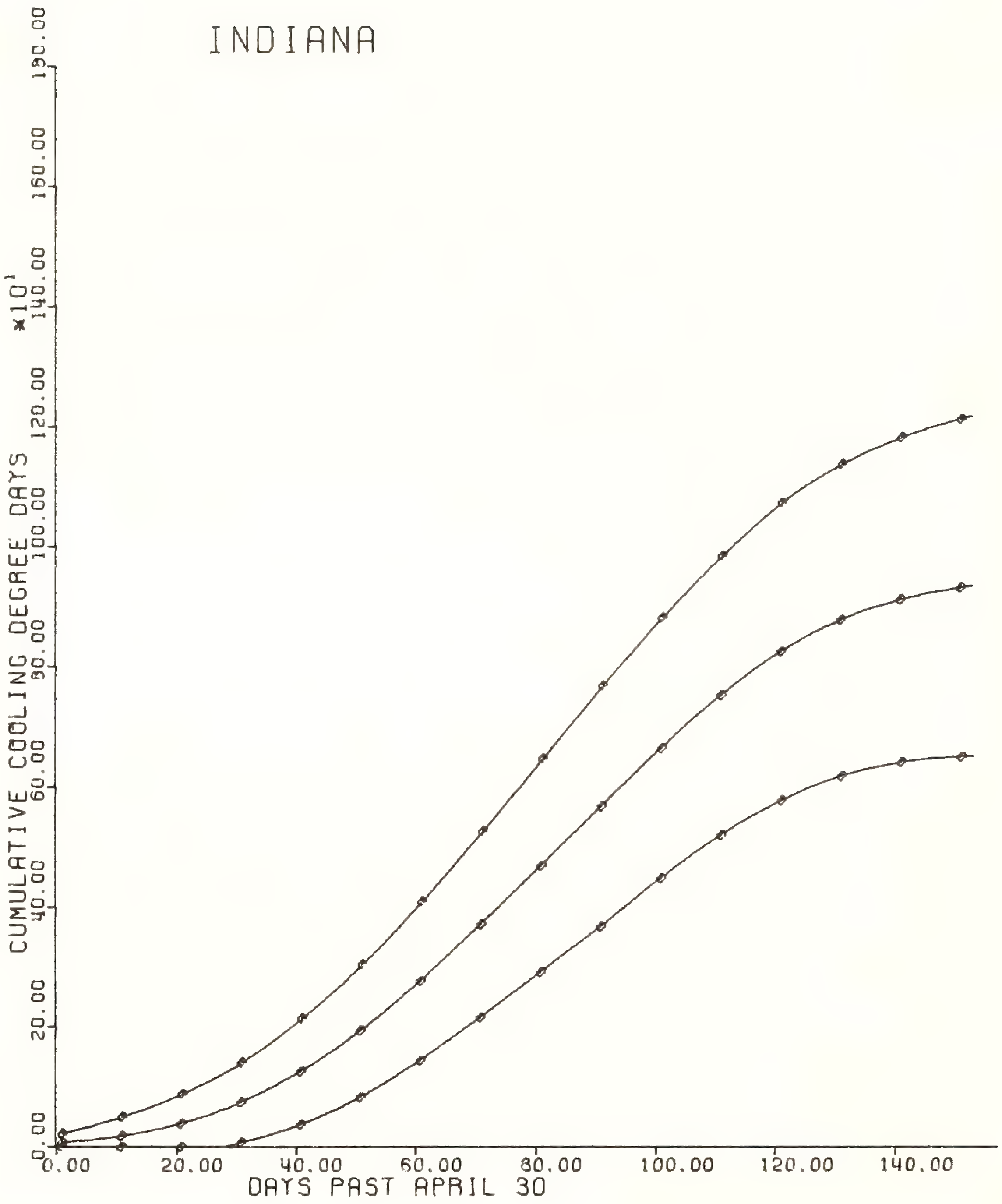
STATION	WEIGHT
MISSOULA, MT	.0407
BOISE	.4769
LEWISTON	.1851
POCATELLO	.2973



INDIANA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	16	46	19
20	0	36	84	29
30	4	69	134	40
40	33	120	207	53
50	77	186	295	66
60	137	268	399	80
70	208	362	516	94
80	284	460	636	107
90	360	559	758	121
100	441	657	873	132
110	515	746	977	141
120	574	821	1068	151
130	616	875	1134	158
140	641	911	1181	165
150	652	933	1214	171
153	653	937	1221	173

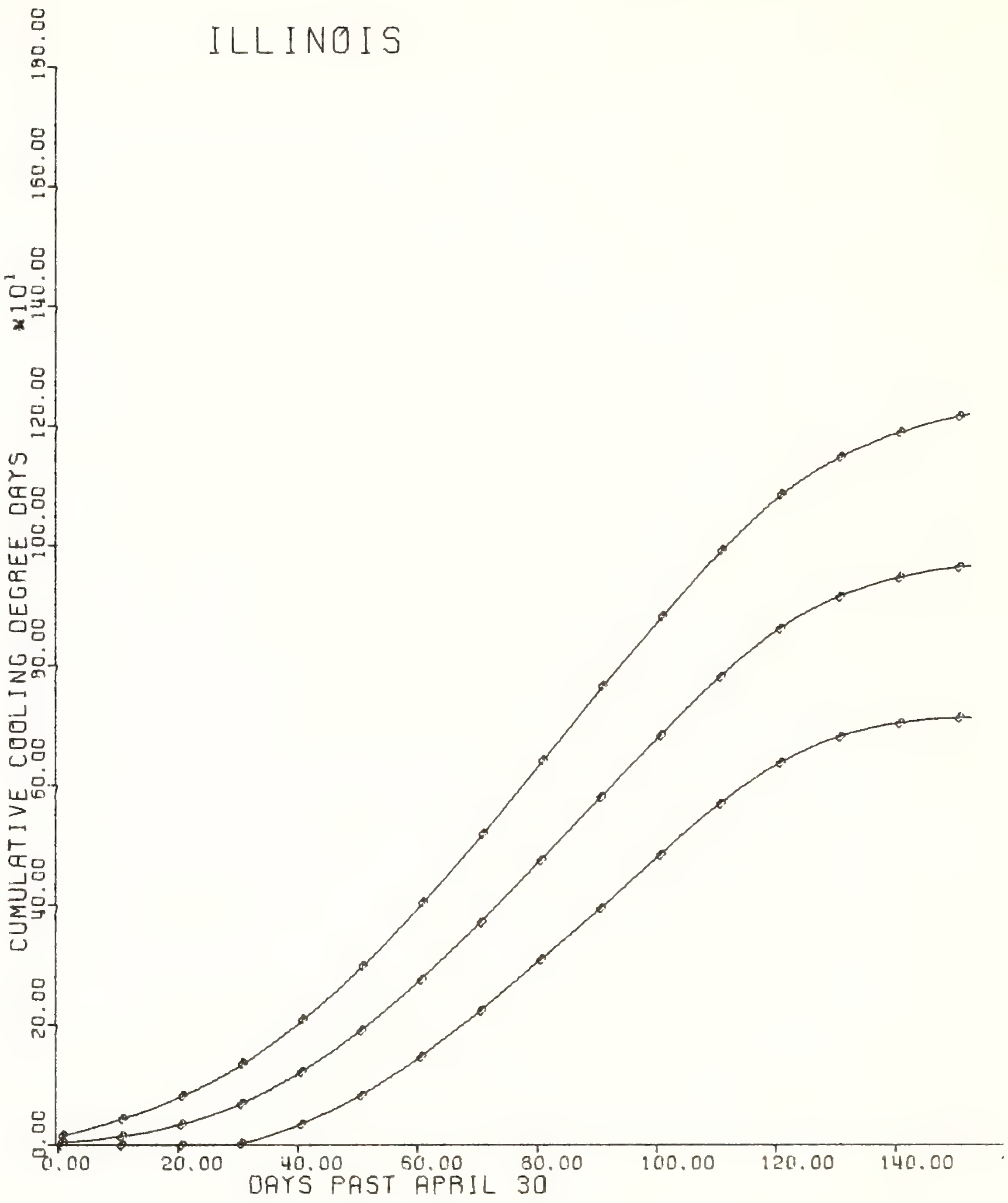
STATION	WEIGHT
CHICAGO, IL	.1421
LOUISVILLE, KY	.0198
CINCINNATI, OH	.0420
EVANSVILLE	.0838
FT. WAYNE	.0949
INDIANAPOLIS	.4823
SOUTH BEND	.1351


INDIANA

ILLINOIS
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	13	41	17
20	0	32	78	28
30	0	64	129	39
40	30	115	200	52
50	78	184	290	65
60	140	267	394	77
70	216	362	508	89
80	301	466	631	100
90	386	570	754	112
100	476	674	872	120
110	563	773	983	128
120	633	856	1079	136
130	679	912	1145	142
140	704	946	1188	148
150	714	965	1216	153
153	714	968	1222	155

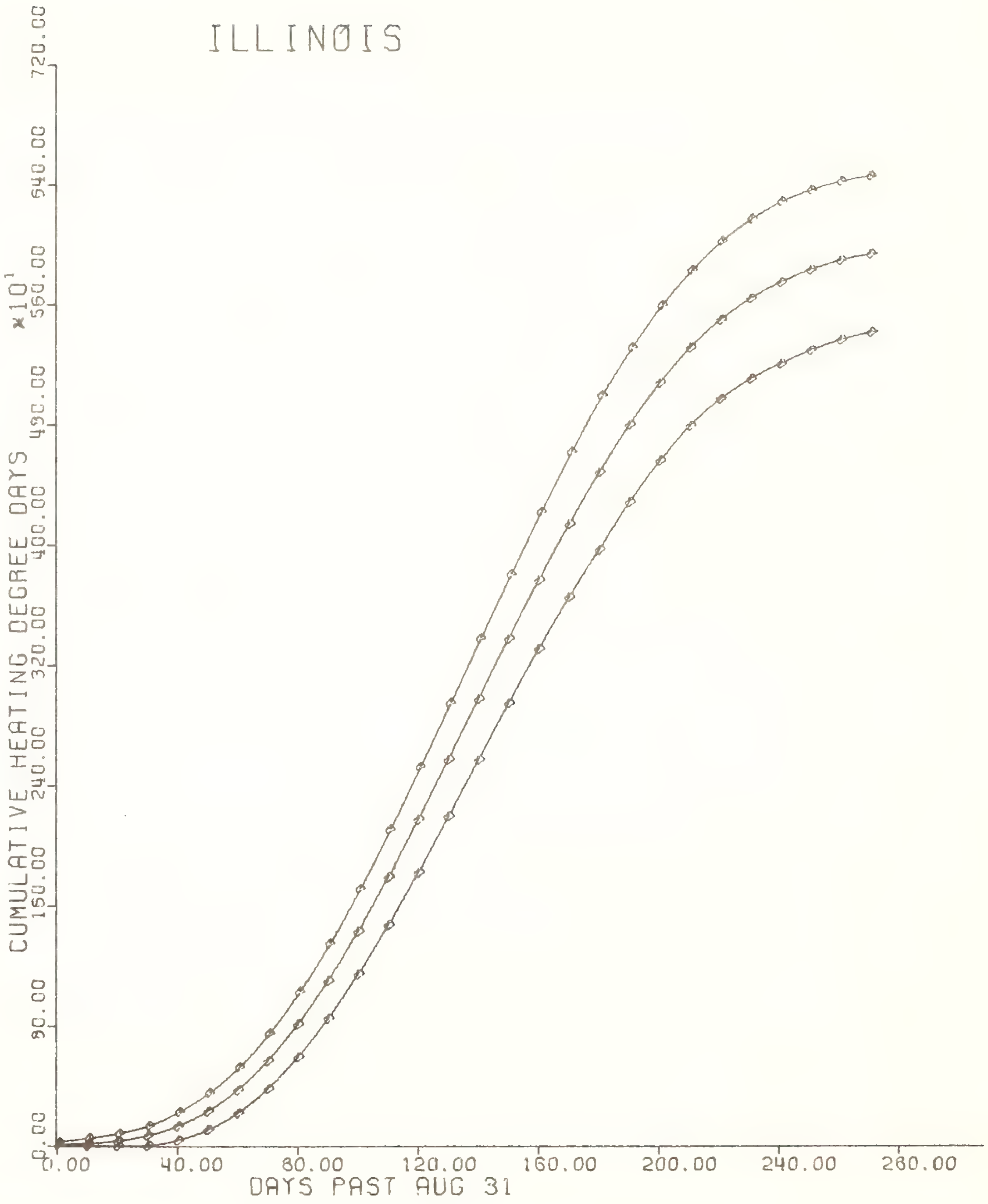
STATION	WEIGHT
BURLINGTON, IA	.0250
CAIRO	.0492
CHICAGO	.6514
MOLINE	.0259
PEORIA	.1019
ROCKFORD	.0426
SPRINGFIELD	.0871
EVANSVILLE, IN	.0169



ILLINOIS
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	18	51	20
20	0	33	81	30
30	2	66	130	39
40	33	126	219	57
50	99	221	343	74
60	207	358	509	92
70	363	546	729	112
80	570	786	1002	131
90	823	1071	1319	151
100	1116	1397	1678	172
110	1441	1756	2071	192
120	1789	2138	2487	213
130	2139	2535	2911	229
140	2538	2940	3342	245
150	2914	3342	3770	261
160	3277	3732	4187	277
170	3623	4106	4589	295
180	3944	4456	4968	312
190	4260	4776	5292	315
200	4541	5059	5577	316
210	4778	5297	5816	317
220	4962	5488	6014	321
230	5101	5634	6167	325
240	5205	5746	6287	330
250	5296	5833	6370	328
260	5368	5899	6430	324
270	5419	5943	6467	320
273	5430	5952	6474	319

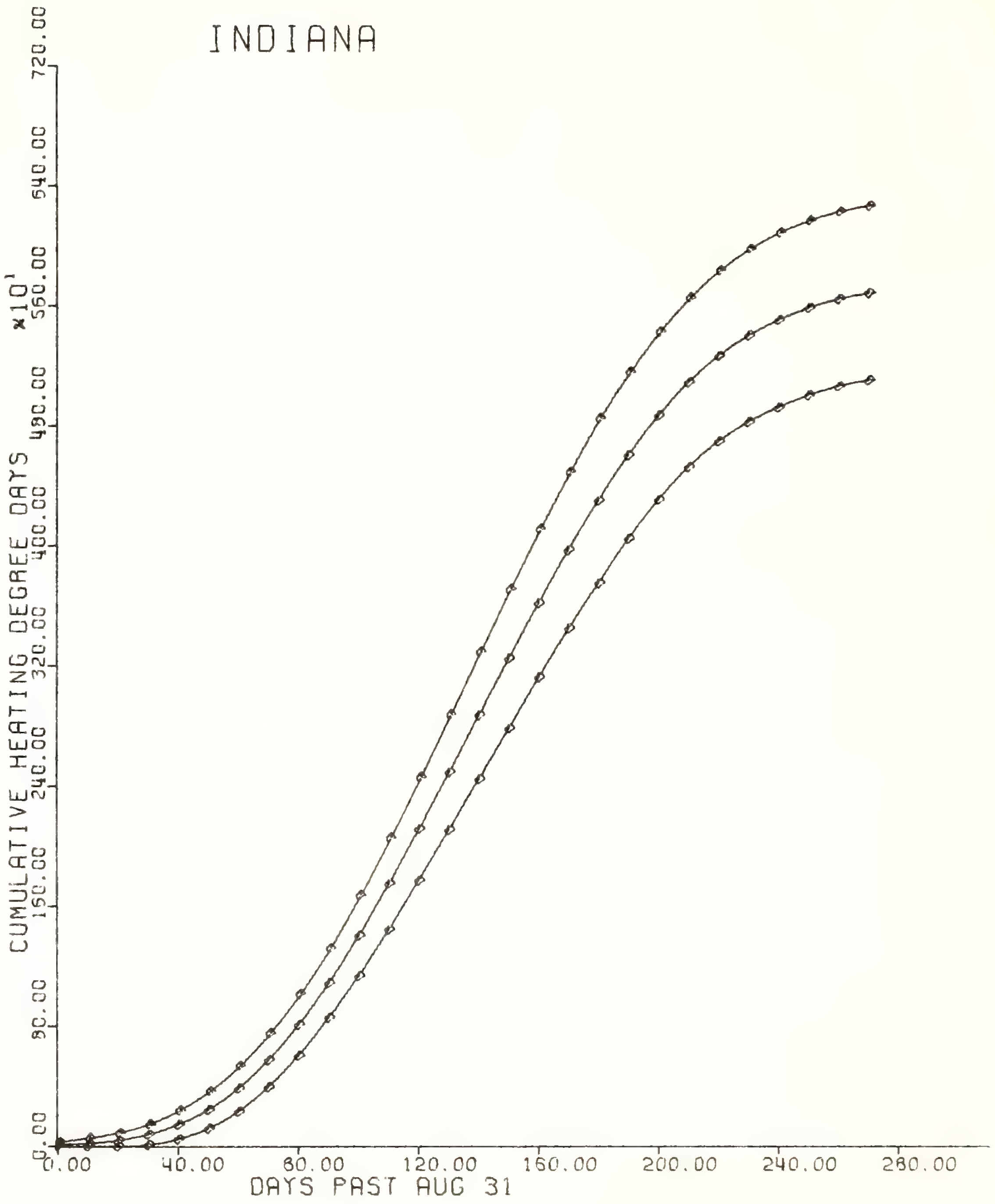
STATION	WEIGHT
BURLINGTON, IA	.0250
CAIRO	.0492
CHICAGO	.6514
MOLINE	.0259
PEORIA	.1019
ROCKFORD	.0426
SPRINGFIELD	.0871
EVANSVILLE, IN	.0169



INDIANA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	19	53	21
20	0	38	88	31
30	9	75	141	40
40	43	137	231	58
50	109	232	355	75
60	218	369	520	92
70	376	553	730	108
80	581	785	989	124
90	830	1060	1290	140
100	1107	1374	1641	163
110	1414	1718	2022	186
120	1741	2083	2425	208
130	2078	2459	2840	233
140	2418	2839	3260	257
150	2755	3216	3677	281
160	3093	3586	4079	301
170	3421	3942	4463	318
180	3727	4276	4825	335
190	4025	4581	5137	339
200	4289	4850	5411	342
210	4512	5077	5642	345
220	4686	5259	5830	348
230	4821	5398	5975	352
240	4922	5505	6088	356
250	5004	5588	6172	356
260	5067	5650	6233	356
270	5109	5691	6273	355
273	5117	5699	6281	355

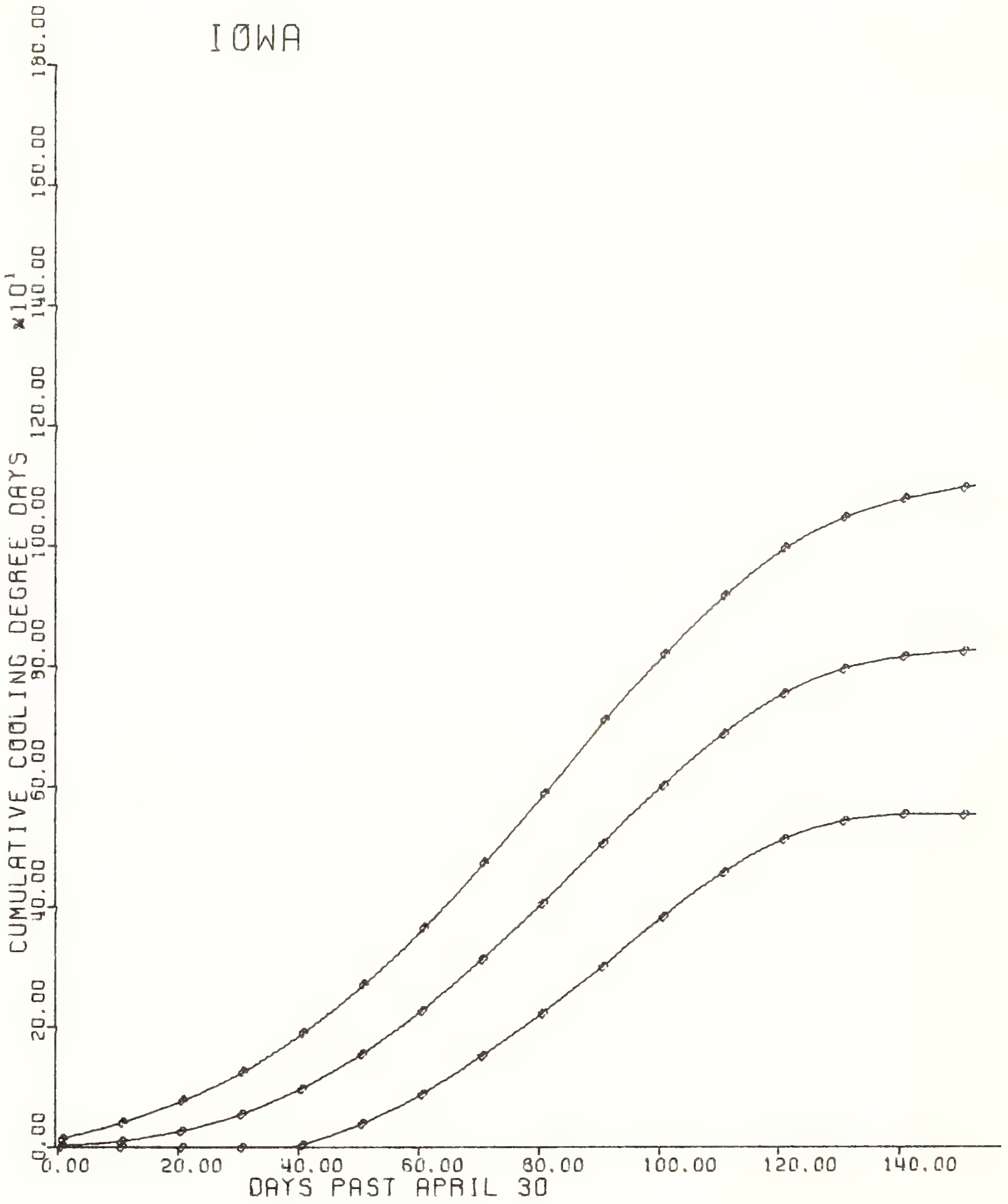
STATION	WEIGHT
CHICAGO, IL	.1421
LOUISVILLE, KY	.0198
CINCINNATI, OH	.0420
EVANSVILLE	.0838
FT. WAYNE	.0949
INDIANAPOLIS	.4623
SOUTH BEND	.1351



IOWA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	9	38	18
20	0	25	74	30
30	0	51	120	42
40	1	92	183	56
50	34	148	262	69
60	83	219	355	83
70	145	304	463	97
80	215	396	577	110
90	293	496	699	124
100	376	593	810	133
110	451	680	909	140
120	508	749	990	147
130	542	793	1044	153
140	554	815	1076	159
150	555	826	1097	165
153	554	828	1102	167

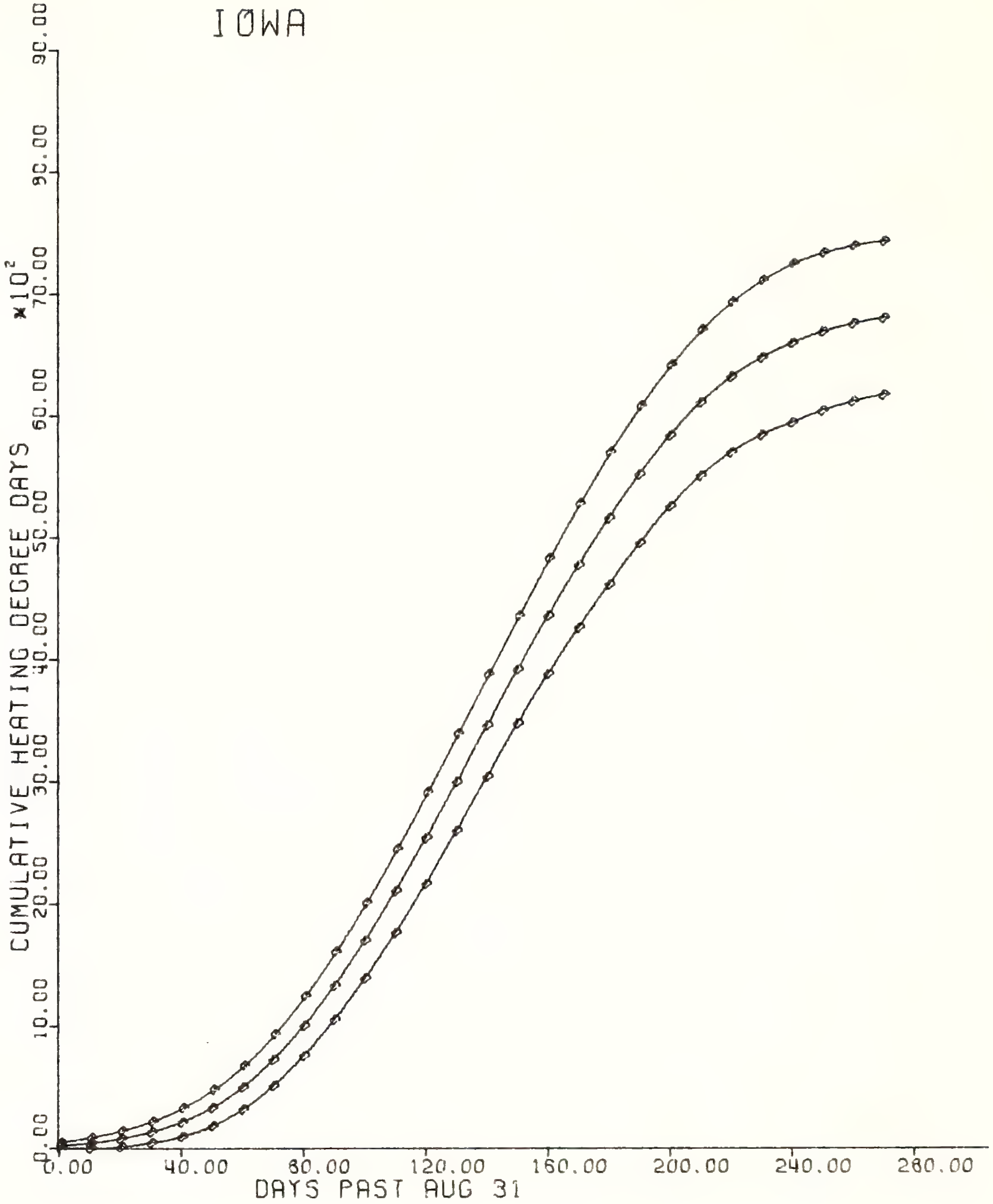
STATION	WEIGHT
OMAHA, NB	.0641
BURLINGTON	.0881
DES MOINES	.3419
DUBUQUE	.3419
SIOUX CITY	.1640



IOWA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	40	85	28
20	9	74	139	40
30	42	127	212	52
40	89	205	321	70
50	174	320	466	89
60	305	481	657	108
70	491	700	909	128
80	733	975	1217	148
90	1024	1299	1574	168
100	1359	1666	1973	187
110	1729	2069	2409	207
120	2129	2501	2873	227
130	2559	2955	3351	241
140	3002	3419	3836	255
150	3439	3878	4317	268
160	3849	4319	4769	287
170	4231	4736	5241	308
180	4587	5128	5669	330
190	4929	5490	6051	342
200	5234	5813	6392	353
210	5491	6088	6685	364
220	5689	6305	6921	375
230	5836	6470	7104	386
240	5941	6593	7245	397
250	6041	6689	7337	395
260	6119	6759	7399	390
270	6175	6807	7439	385
273	6169	6818	7447	384

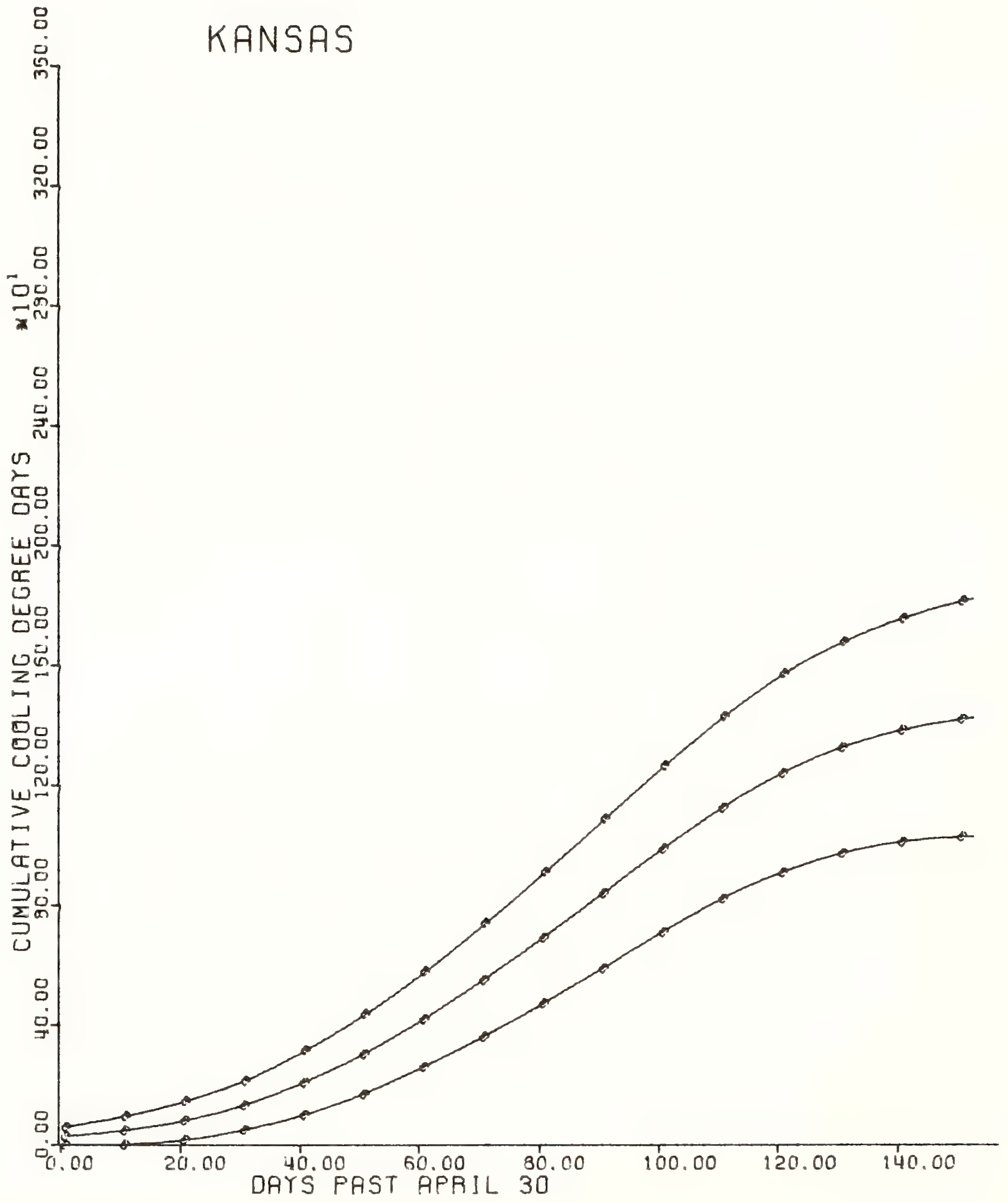
STATION	WEIGHT
OMAHA, NB	.0641
BURLINGTON	.0881
DES MOINES	.3419
DUBUQUE	.3419
SIOUX CITY	.1640



KANSAS
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	46	92	28
20	14	77	140	39
30	47	127	207	49
40	95	200	305	64
50	163	294	425	80
60	251	408	565	96
70	351	538	725	114
80	462	679	896	132
90	580	827	1074	151
100	701	976	1251	168
110	814	1116	1418	184
120	905	1234	1563	201
130	972	1323	1674	214
140	1013	1384	1755	226
150	1031	1422	1813	239
153	1033	1430	1827	242

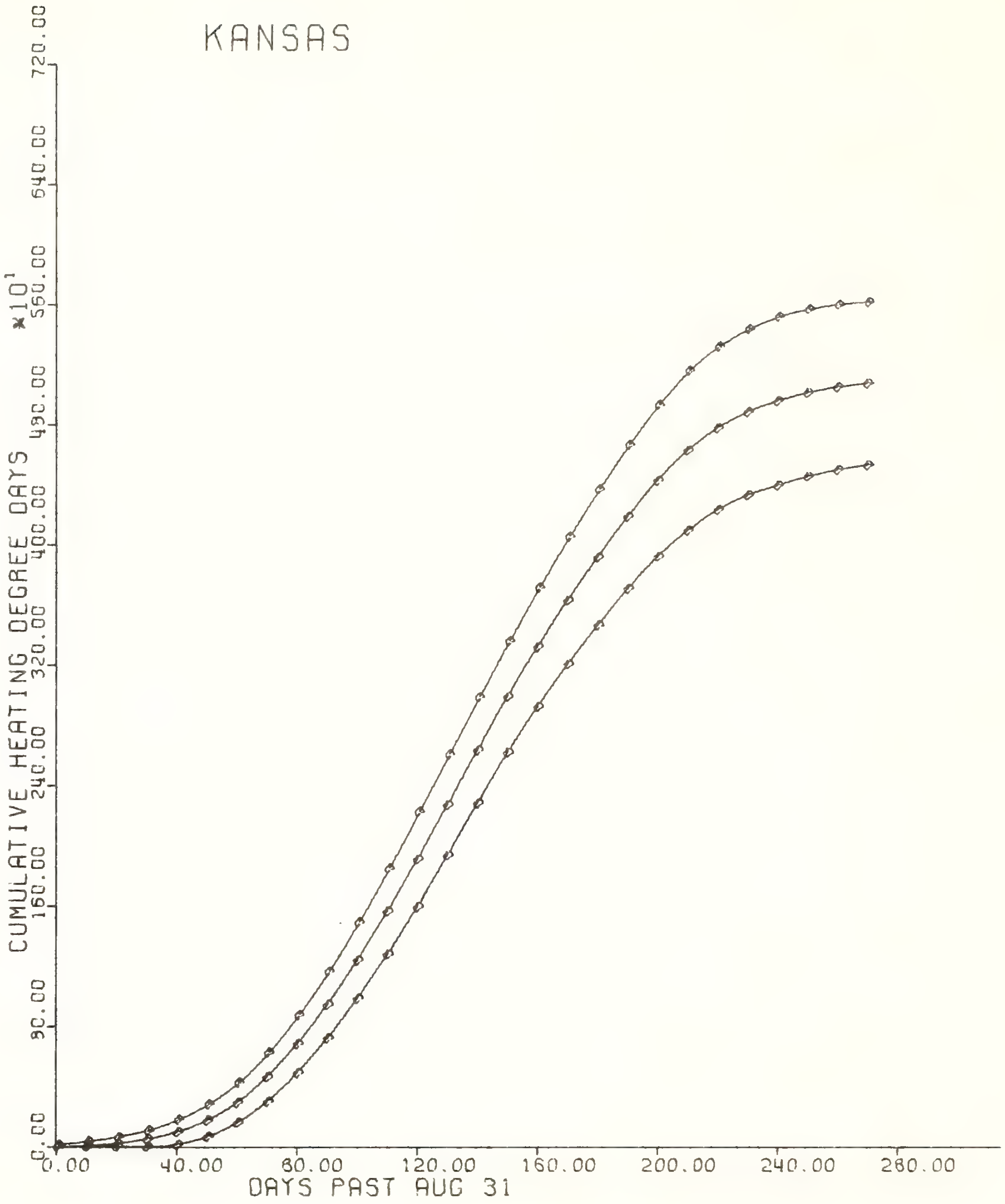
STATION	WEIGHT
CONCORDIA	.1282
DODGE CITY	.0583
GOODLAND	.0200
TOPEKA	.4359
WICHITA	.3576



KANSAS
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	7	35	17
20	0	22	64	26
30	0	49	106	34
40	12	94	176	50
50	60	167	274	65
60	149	281	413	80
70	285	446	607	98
80	470	661	852	116
90	699	919	1139	134
100	959	1211	1463	153
110	1250	1533	1816	173
120	1563	1878	2193	192
130	1904	2239	2574	204
140	2251	2603	2955	215
150	2589	2959	3329	226
160	2898	3293	3688	241
170	3182	3605	4028	258
180	3444	3895	4346	275
190	3689	4167	4645	291
200	3907	4411	4915	308
210	4085	4616	5147	324
220	4227	4771	5315	332
230	4329	4882	5435	337
240	4397	4959	5521	343
250	4456	5015	5574	341
260	4503	5055	5607	337
270	4535	5080	5625	332
273	4542	5065	5628	331

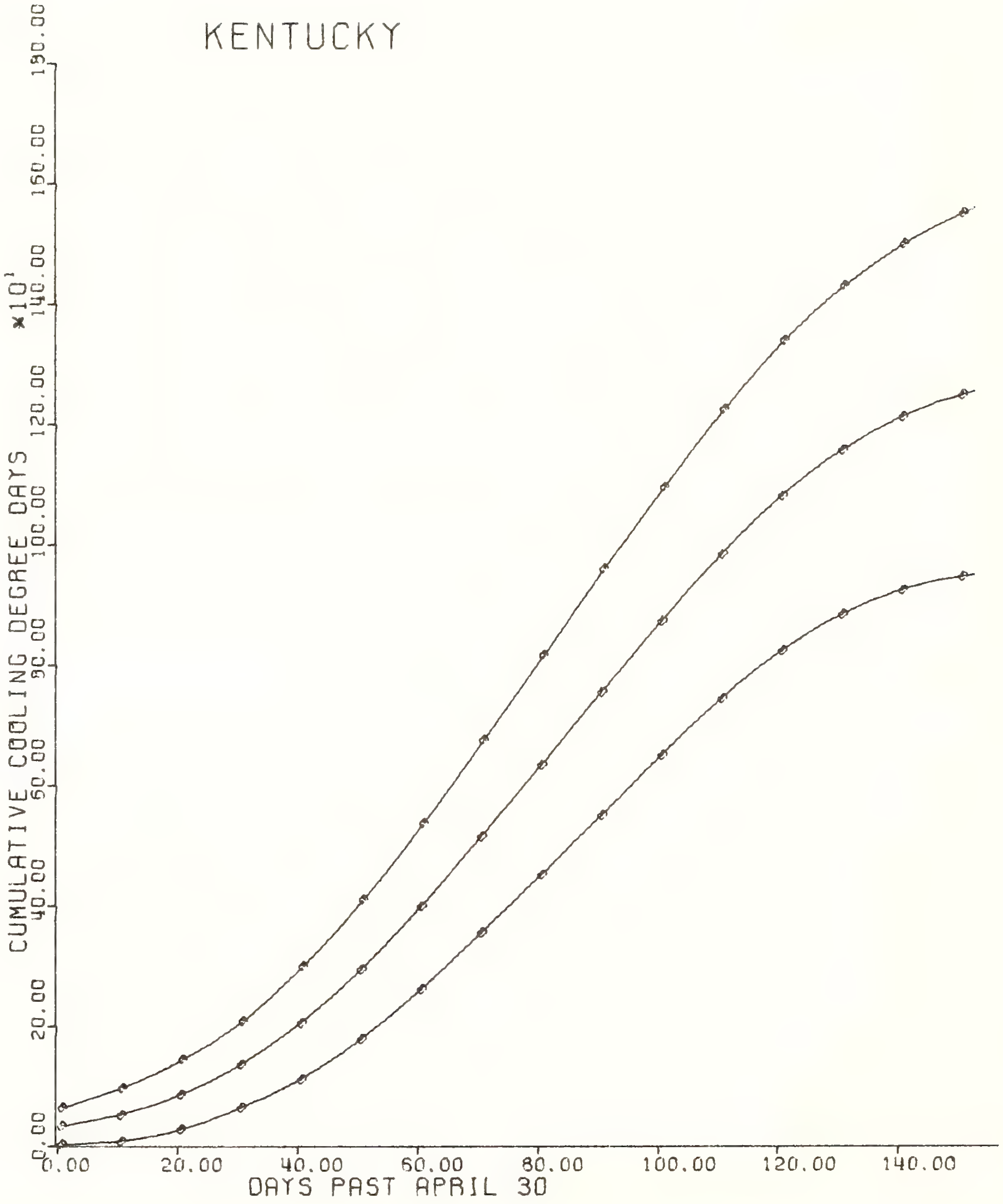
STATION	WEIGHT
CONCORDIA	.1282
DODGE CITY	.0583
GOODLAND	.0200
TOPEKA	.4359
WICHITA	.3576



KENTUCKY
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	8	51	94	26
20	25	82	139	35
30	60	131	202	43
40	107	199	291	56
50	171	285	399	69
60	253	389	525	83
70	346	504	662	96
80	443	623	803	110
90	541	744	947	124
100	641	862	1083	135
110	736	975	1214	146
120	819	1075	1331	156
130	880	1152	1424	166
140	924	1210	1496	175
150	947	1248	1549	183
153	952	1257	1562	186

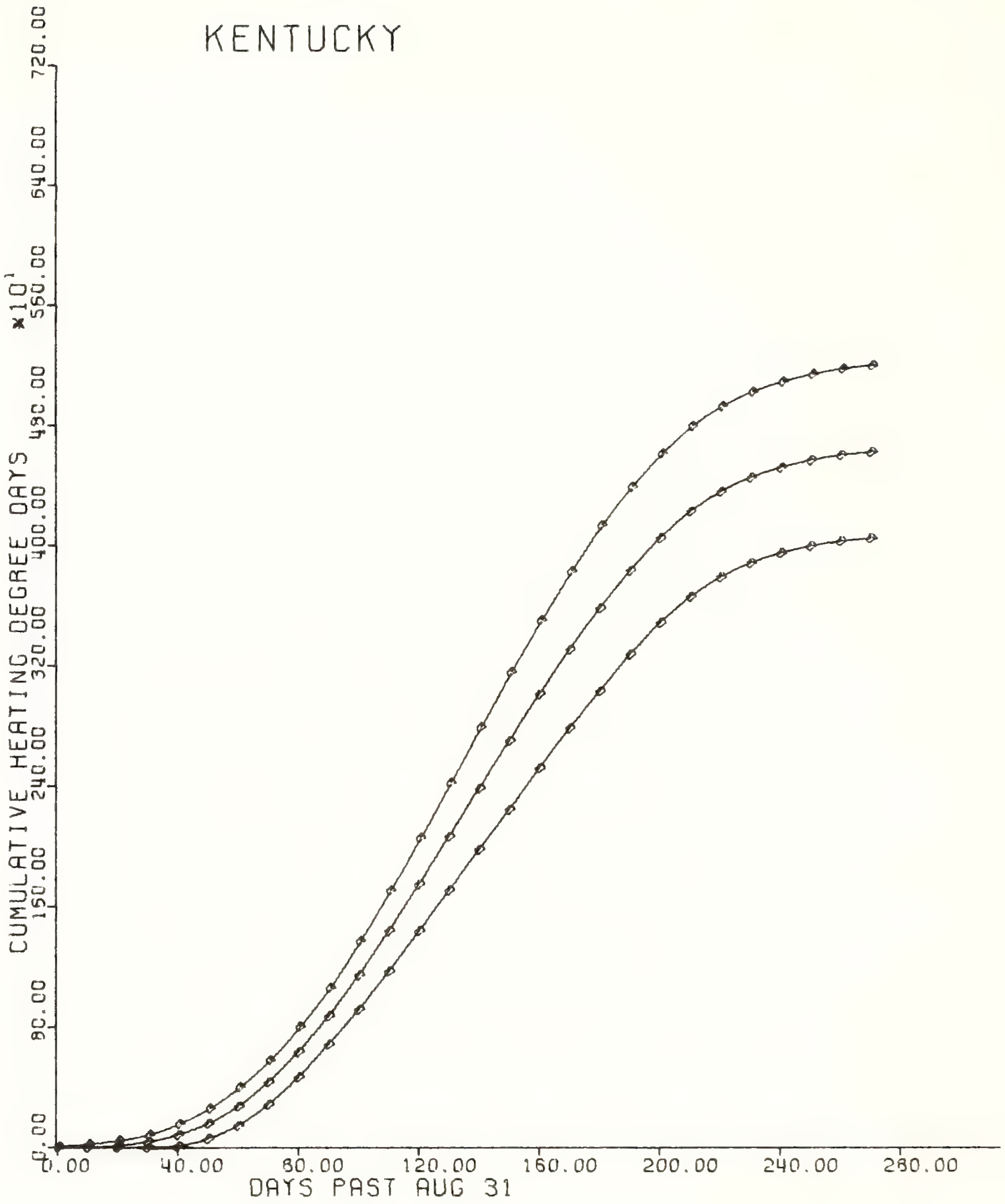
STATION	WEIGHT
CAIRO, IL	.0516
EVANSVILLE, IN	.1218
LEXINGTON	.4753
LOUISVILLE	.3513



KENTUCKY
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	1	20	11
20	0	12	44	19
30	0	36	80	27
40	8	79	150	43
50	54	152	250	60
60	136	261	386	76
70	270	416	562	89
80	450	615	780	101
90	665	850	1035	113
100	895	1119	1343	137
110	1147	1412	1677	161
120	1416	1721	2026	166
130	1686	2039	2392	215
140	1958	2360	2762	245
150	2224	2676	3128	275
160	2499	2987	3475	297
170	2767	3285	3803	316
180	3014	3563	4112	335
190	3258	3815	4372	339
200	3474	4036	4598	343
210	3651	4218	4785	346
220	3786	4355	4924	347
230	3884	4453	5022	347
240	3953	4523	5093	347
250	4003	4574	5145	348
260	4035	4608	5181	350
270	4056	4631	5206	351
273	4059	4635	5211	351

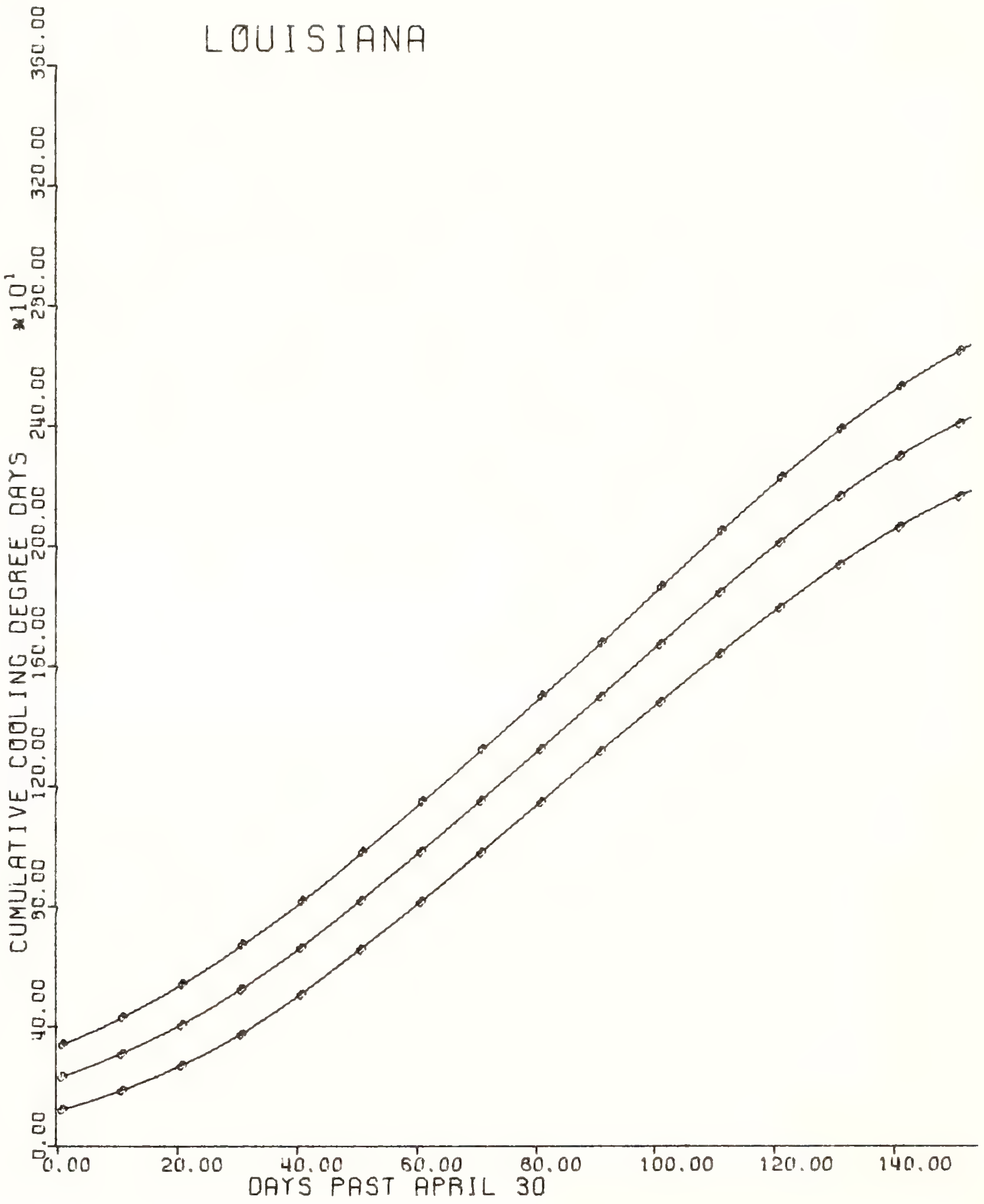
STATION	WEIGHT
CAIRO, IL	.0516
EVANSVILLE, IN	.1218
LEXINGTON	.4753
LOUISVILLE	.3513



LOUISIANA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	178	300	422	74
20	260	395	530	82
30	362	511	660	91
40	493	648	803	95
50	643	804	965	98
60	800	967	1134	102
70	964	1136	1308	105
80	1132	1308	1484	108
90	1301	1482	1663	110
100	1466	1658	1850	117
110	1627	1831	2035	125
120	1782	1999	2216	132
130	1928	2154	2380	138
140	2056	2290	2524	143
150	2161	2403	2645	148
153	2186	2431	2676	149

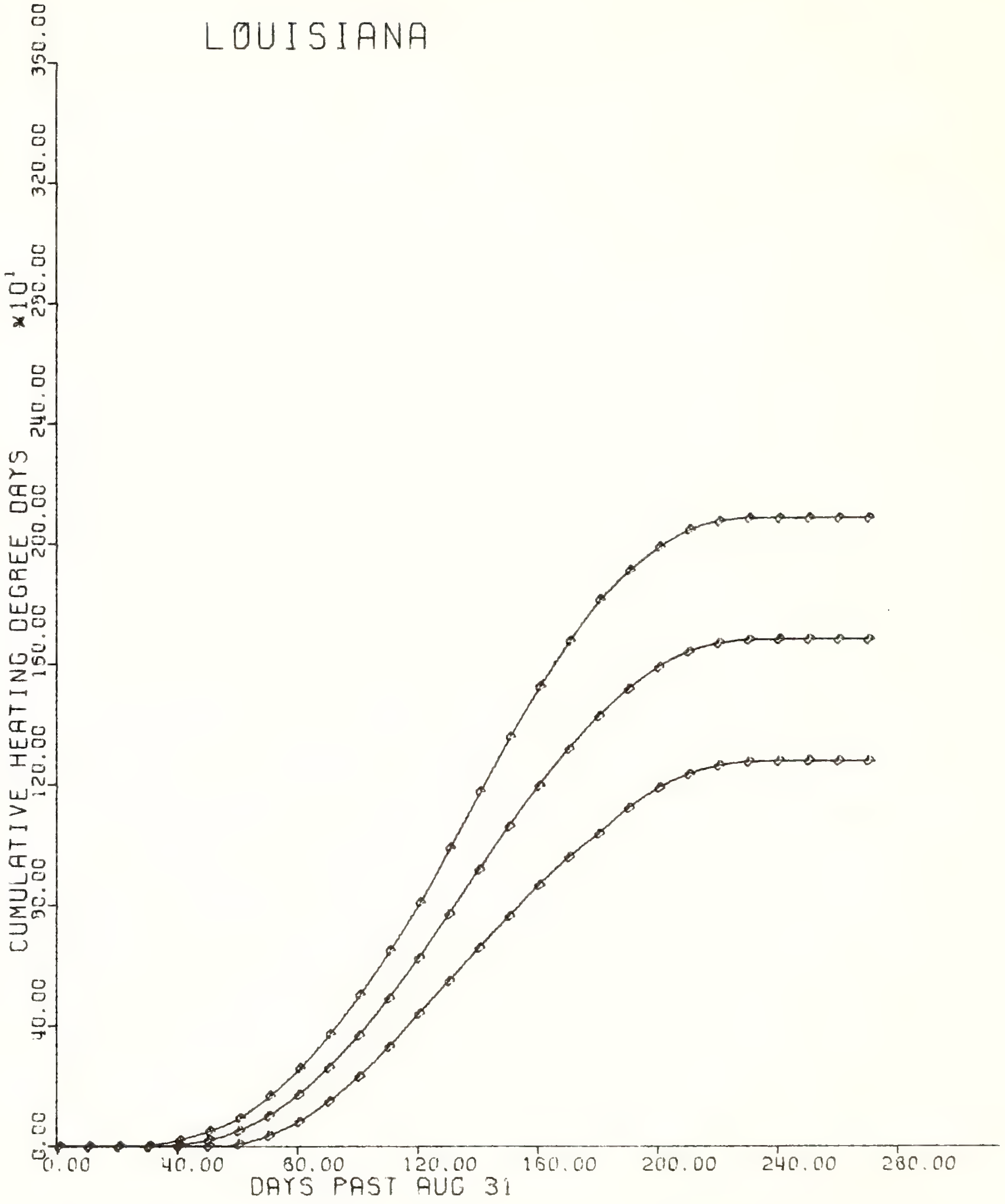
STATION	WEIGHT
JACKSON, MS	.0352
BATON ROUGE	.2472
LAKE CHARLES	.0884
NEW ORLEANS	.4323
SHREVEPORT	.1969



LOUISIANA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	0	0
20	0	0	1	1
30	0	0	1	1
40	0	4	19	9
50	0	18	47	18
60	4	47	90	26
70	30	95	160	39
80	76	163	250	53
90	141	251	361	67
100	223	357	491	82
110	319	478	637	97
120	429	612	795	111
130	538	756	974	133
140	648	904	1160	156
150	754	1049	1344	180
160	858	1185	1512	199
170	952	1309	1666	218
180	1031	1418	1805	236
190	1116	1511	1906	241
200	1185	1585	1985	244
210	1233	1639	2045	248
220	1263	1669	2075	248
230	1278	1683	2088	247
240	1281	1685	2089	246
250	1282	1686	2090	246
260	1282	1686	2090	246
270	1282	1686	2090	246
273	1282	1686	2090	246

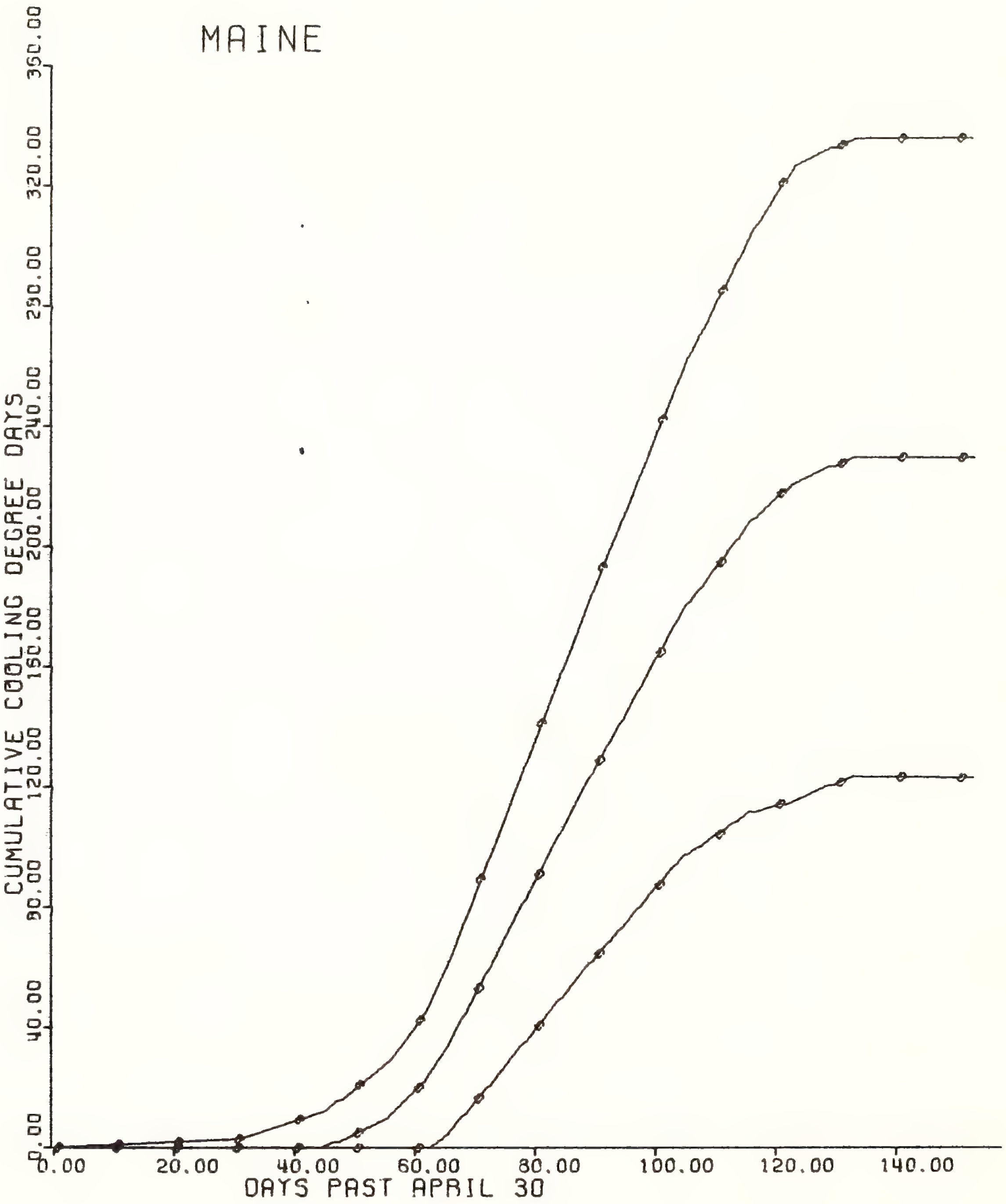
STATION	WEIGHT
JACKSON, MS	.0352
BATON ROUGE	.2472
LAKE CHARLES	.0884
NEW ORLEANS	.4323
SHREVEPORT	.1969



MAINE
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTEPVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	1	1
20	0	0	2	1
30	0	0	3	2
40	0	0	9	5
50	0	4	19	9
60	0	18	40	13
70	14	49	84	21
80	38	87	136	30
90	62	125	168	38
100	86	162	238	46
110	104	193	282	54
120	114	216	318	62
130	121	227	333	65
140	124	230	336	65
150	123	230	337	65
153	123	230	337	65

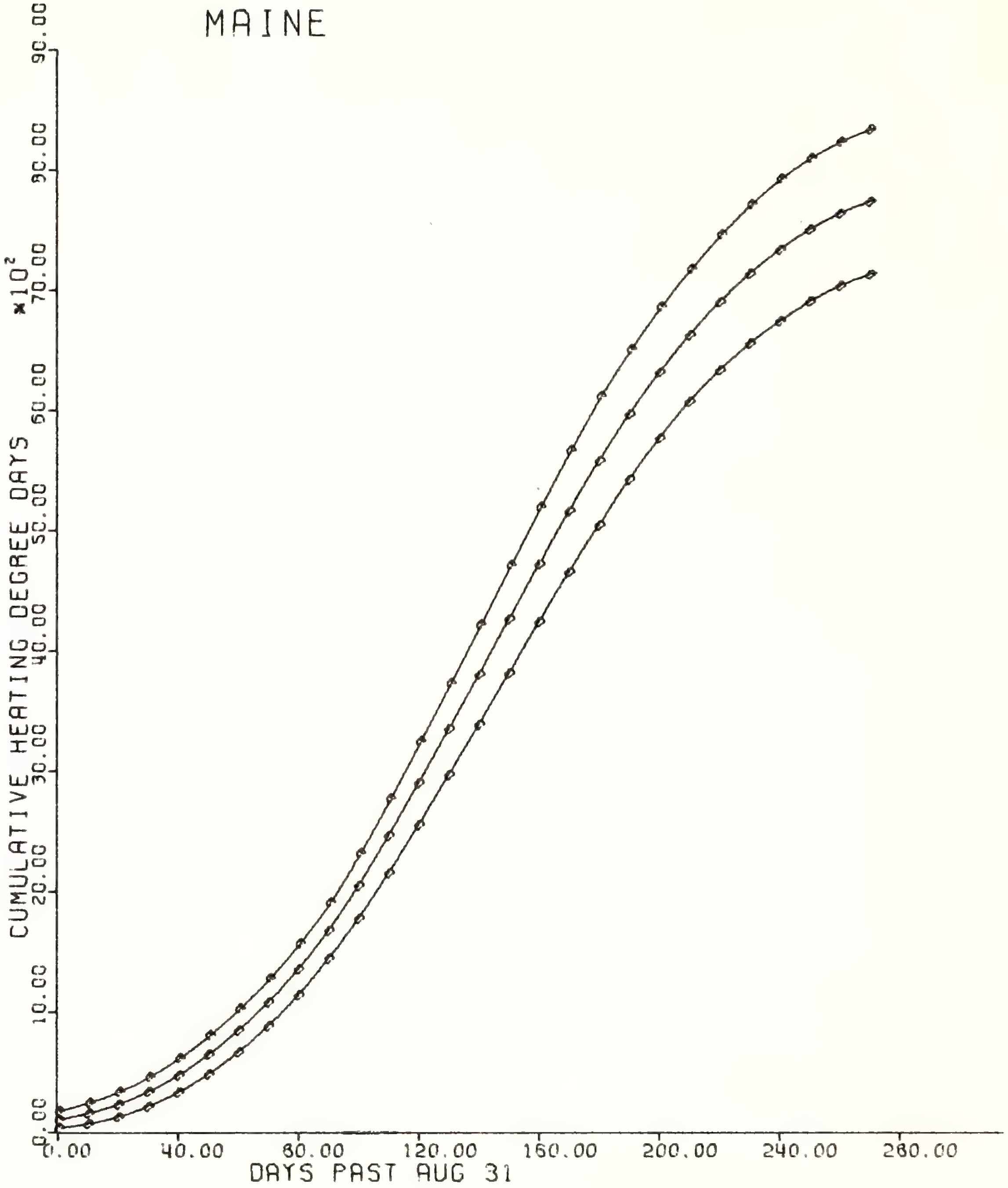
STATION	WEIGHT
CARIBOU	.1784
PORTLAND	.8216



MAINE
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	66	153	240	53
20	120	225	330	64
30	204	327	450	75
40	318	461	604	87
50	466	628	790	99
60	645	827	1009	111
70	860	1059	1258	121
80	1113	1329	1545	132
90	1412	1645	1878	142
100	1744	2014	2284	164
110	2117	2425	2733	188
120	2515	2861	3207	211
130	2930	3310	3690	232
140	3348	3762	4176	252
150	3774	4222	4670	273
160	4201	4679	5157	292
170	4617	5124	5631	309
180	5012	5548	6084	327
190	5393	5937	6481	332
200	5740	6289	6838	335
210	6050	6604	7158	338
220	6314	6881	7448	345
230	6542	7122	7702	354
240	6732	7326	7920	362
250	6897	7497	8097	366
260	7031	7634	8237	368
270	7131	7737	8343	370
273	7154	7761	8368	370

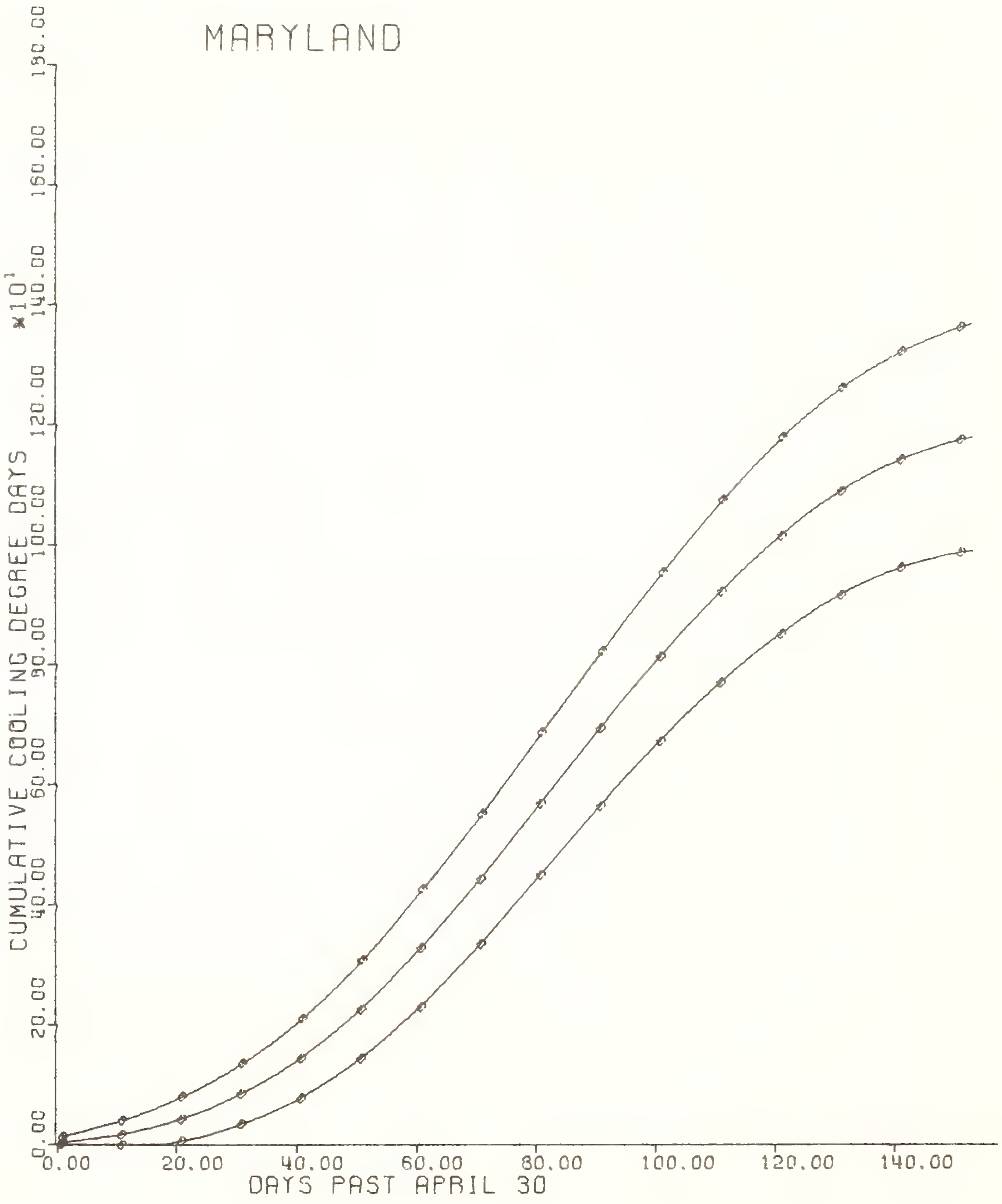
STATION	WEIGHT
CARIBOU	.1784
PORTLAND	.8216



MARYLAND
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	15	37	13
20	4	40	76	22
30	30	80	130	30
40	72	137	202	40
50	136	217	298	49
60	221	318	415	59
70	323	431	539	66
80	438	556	674	72
90	553	682	811	78
100	663	803	943	85
110	761	913	1065	92
120	845	1008	1171	99
130	912	1084	1256	105
140	958	1138	1318	110
150	986	1173	1360	114
153	990	1180	1370	116

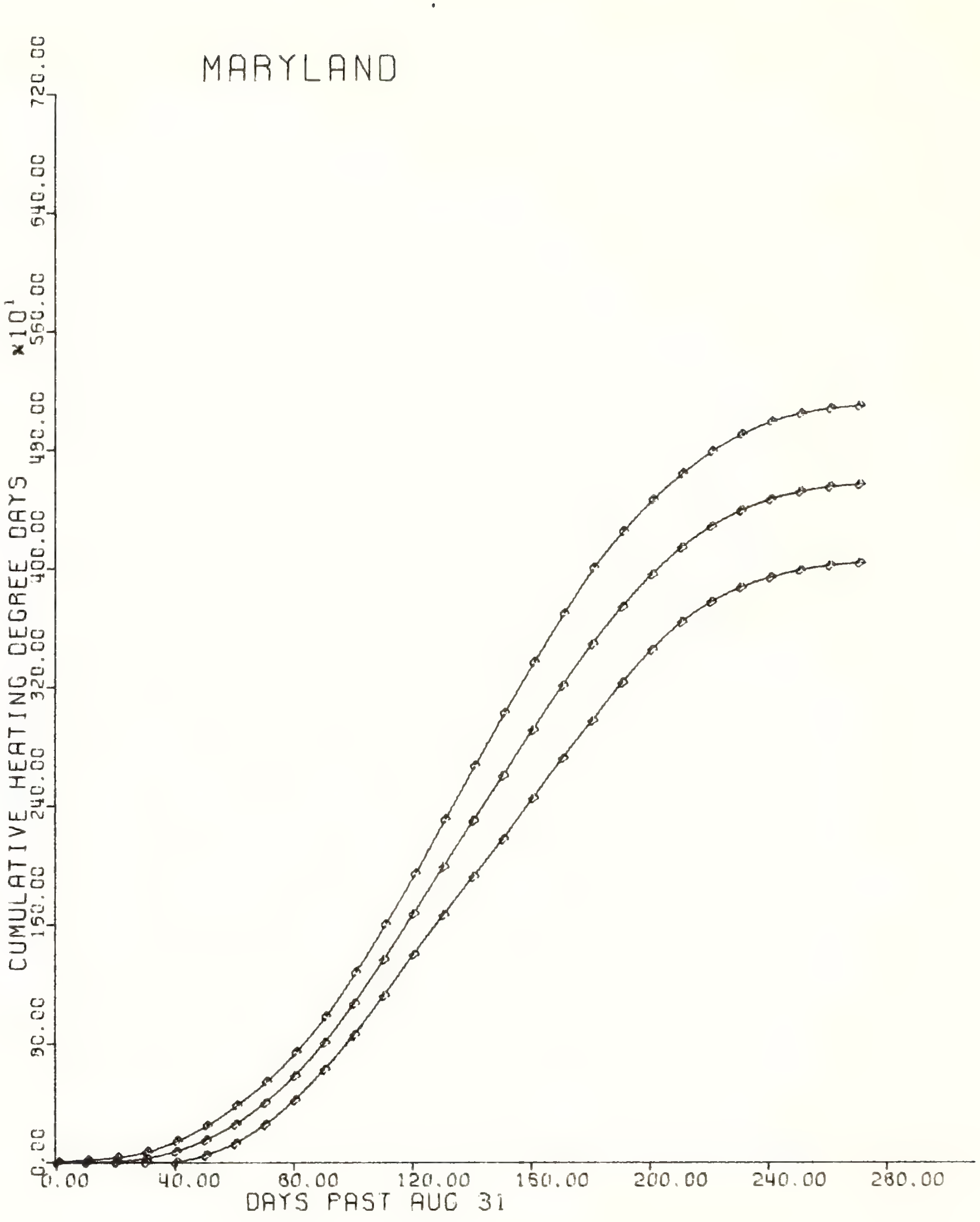
STATION	WEIGHT
HARRISBURG, PA	.0479
WILMINGTON, DE	.0089
WASHINGTON DC	.2925
NORFOLK, VA	.0250
PITTSBURGH, PA	.0054
BALTIMORE	.6203



MARYLAND
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	15	9
20	0	5	33	17
30	0	24	65	25
40	0	68	137	42
50	43	140	237	59
60	119	245	371	77
70	240	384	528	88
80	402	563	724	98
90	604	783	962	109
100	836	1044	1252	127
110	1098	1337	1576	146
120	1375	1646	1917	165
130	1642	1960	2278	194
140	1902	2272	2642	225
150	2156	2577	2998	257
160	2428	2885	3342	278
170	2700	3185	3670	296
180	2955	3468	3981	313
190	3210	3722	4234	312
200	3437	3944	4451	309
210	3627	4129	4631	306
220	3767	4276	4785	310
230	3869	4386	4903	315
240	3941	4467	4993	321
250	3993	4521	5049	322
260	4027	4556	5085	322
270	4046	4575	5104	323
273	4049	4578	5107	323

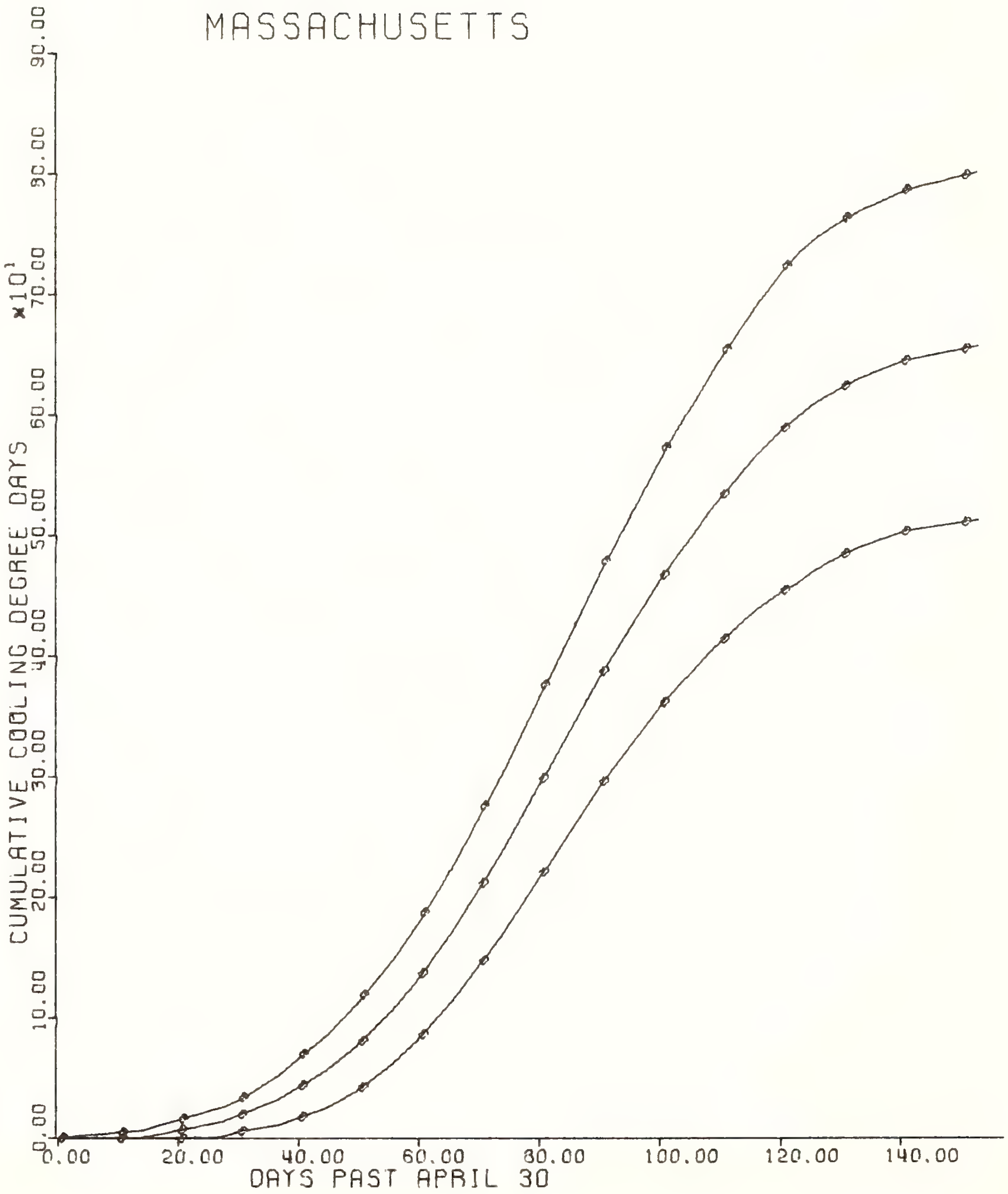
STATION	WEIGHT
HARRISBURG, PA	.0479
WILMINGTON, DE	.0089
WASHINGTON DC	.2925
NORFOLK, VA	.0250
PITTSBURGH, PA	.0054
BALTIMORE	.6203



MASSACHUSSETTS
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	5	3
20	0	6	15	6
30	4	18	32	8
40	16	41	66	15
50	39	76	113	23
60	81	130	179	30
70	141	204	267	38
80	213	290	367	47
90	289	379	469	55
100	356	460	564	64
110	410	529	648	72
120	452	585	718	81
130	483	622	761	85
140	502	644	786	86
150	511	655	799	88
153	513	658	803	88

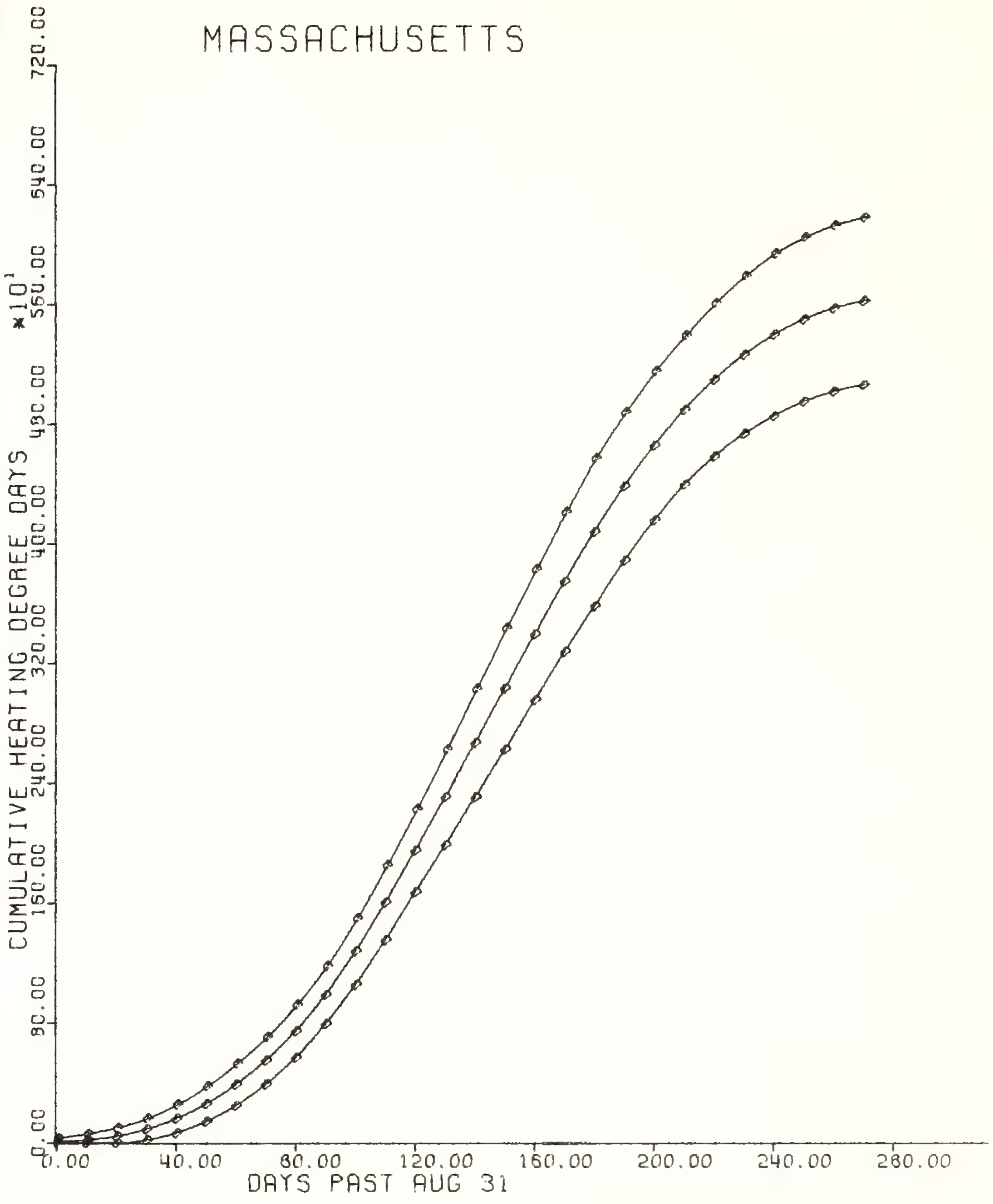
STATION	WEIGHT
ALBANY, NY	.0329
BOSTON	.9671



MASSACHUSSETTS
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	20	60	24
20	0	44	100	34
30	16	87	158	43
40	62	156	250	58
50	133	251	369	72
60	237	378	519	86
70	375	534	693	97
80	551	728	905	108
90	771	965	1159	118
100	1029	1250	1471	135
110	1325	1574	1823	152
120	1643	1920	2197	169
130	1958	2275	2592	193
140	2277	2637	2997	220
150	2596	3000	3404	246
160	2925	3362	3799	266
170	3252	3717	4182	284
180	3558	4052	4546	301
190	3862	4360	4858	304
200	4136	4636	5136	305
210	4377	4878	5379	305
220	4571	5084	5597	313
230	4726	5255	5784	322
240	4848	5392	5936	332
250	4947	5498	6049	336
260	5019	5575	6131	339
270	5064	5625	6186	342
273	5073	5635	6197	343

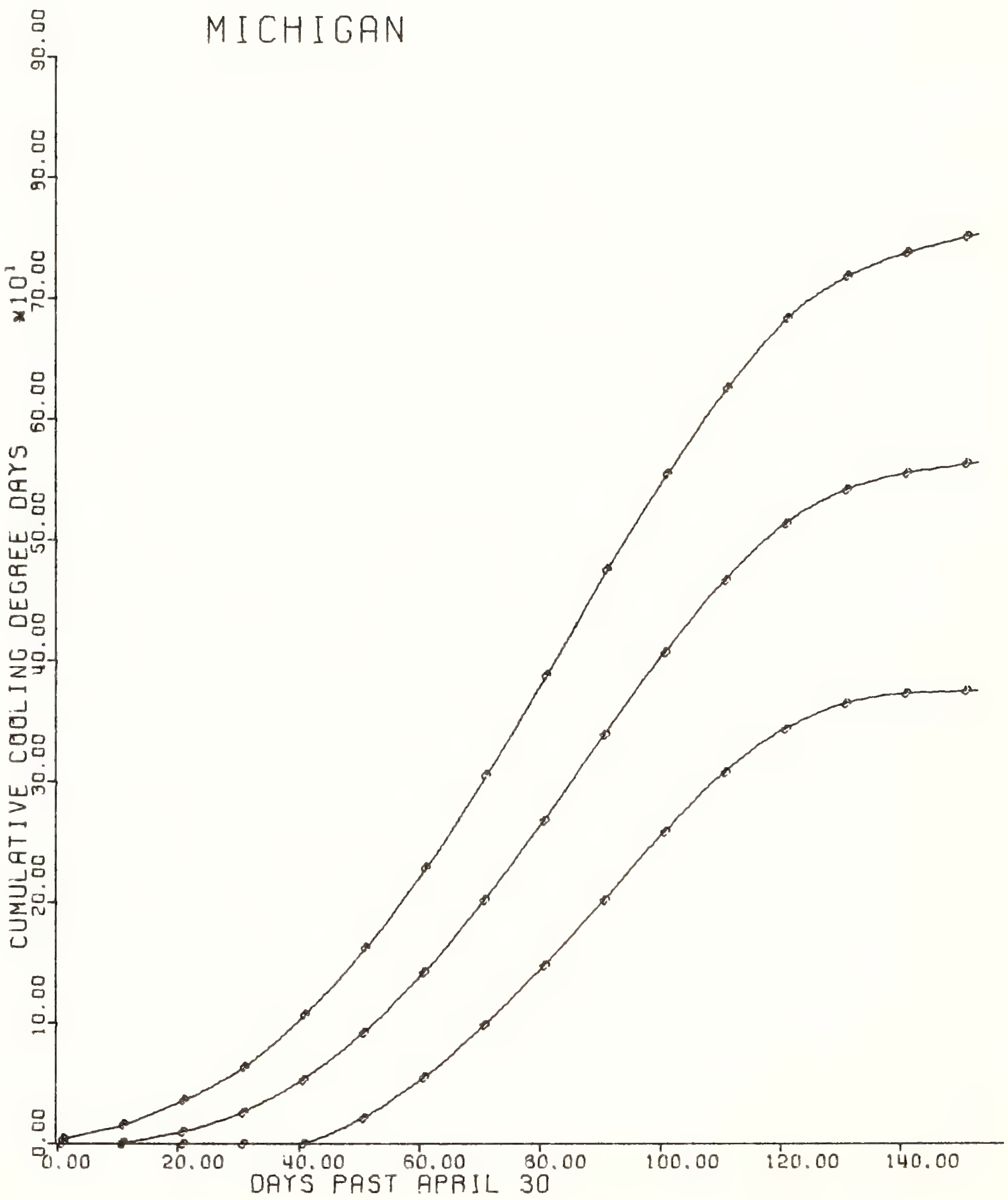
STATION	WEIGHT
ALBANY, NY	.0329
BOSTON	.9671



MICHIGAN
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	14	9
20	0	9	34	15
30	0	24	60	22
40	0	50	102	32
50	19	88	157	42
60	51	136	221	52
70	93	195	297	62
80	142	261	380	72
90	197	332	467	82
100	254	401	548	90
110	304	462	620	96
120	342	511	680	103
130	364	540	716	108
140	373	555	737	111
150	375	563	751	114
153	376	565	754	115

STATION	WEIGHT
ALPENA	.0337
DETROIT	.5423
FLINT	.1084
GRAND RAPIDS	.1207
HOUGHTON LAKE	.0103
LANSING	.1344
MARQUETTE	.0126
MUSKEGON	.0261
SAULT STE. MARIE	.0115

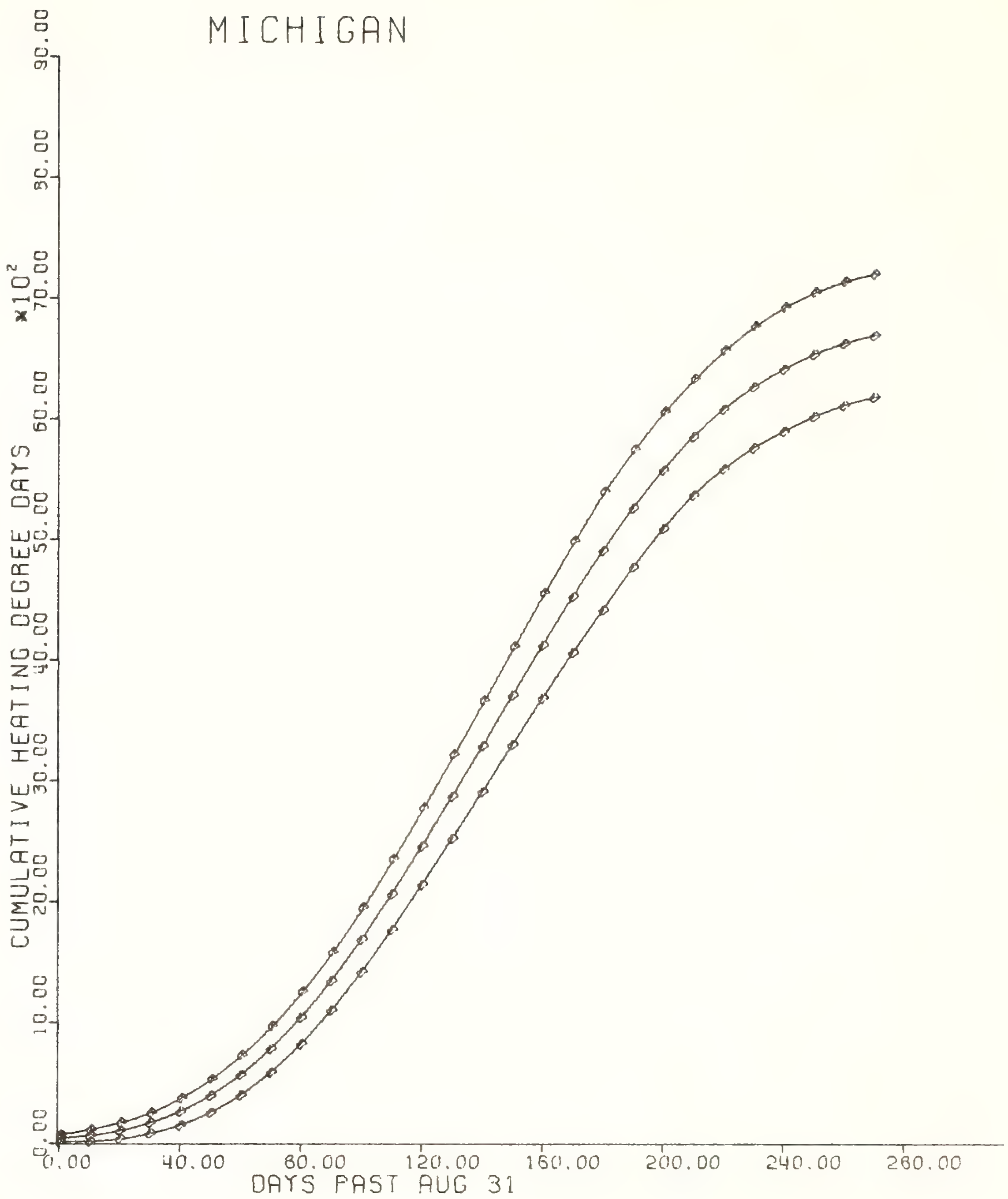


MICHIGAN
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	18	65	112	29
20	37	103	169	40
30	80	164	248	51
40	144	255	366	68
50	245	383	521	84
60	385	550	715	100
70	571	761	951	116
80	801	1016	1231	131
90	1074	1314	1554	146
100	1389	1655	1921	162
110	1736	2028	2320	178
120	2108	2425	2742	193
130	2489	2835	3181	211
140	2876	3251	3626	229
150	3266	3671	4076	247
160	3652	4086	4520	264
170	4030	4492	4954	282
180	4386	4877	5368	299
190	4743	5233	5723	299
200	5067	5554	6041	297
210	5350	5833	6316	295
220	5574	6066	6558	300
230	5753	6256	6759	307
240	5893	6408	6923	314
250	6017	6532	7047	314
260	6114	6627	7140	313
270	6184	6695	7206	312
273	6199	6710	7221	311

STATION	WEIGHT
ALPENA	.0337
DETROIT	.5423
FLINT	.1084
GRAND RAPIDS	.1207
HOUGHTON LAKE	.0103
LANSING	.1344
MARQUETTE	.0126
MUSKEGON	.0261
SAULT STE. MARIE	.0115

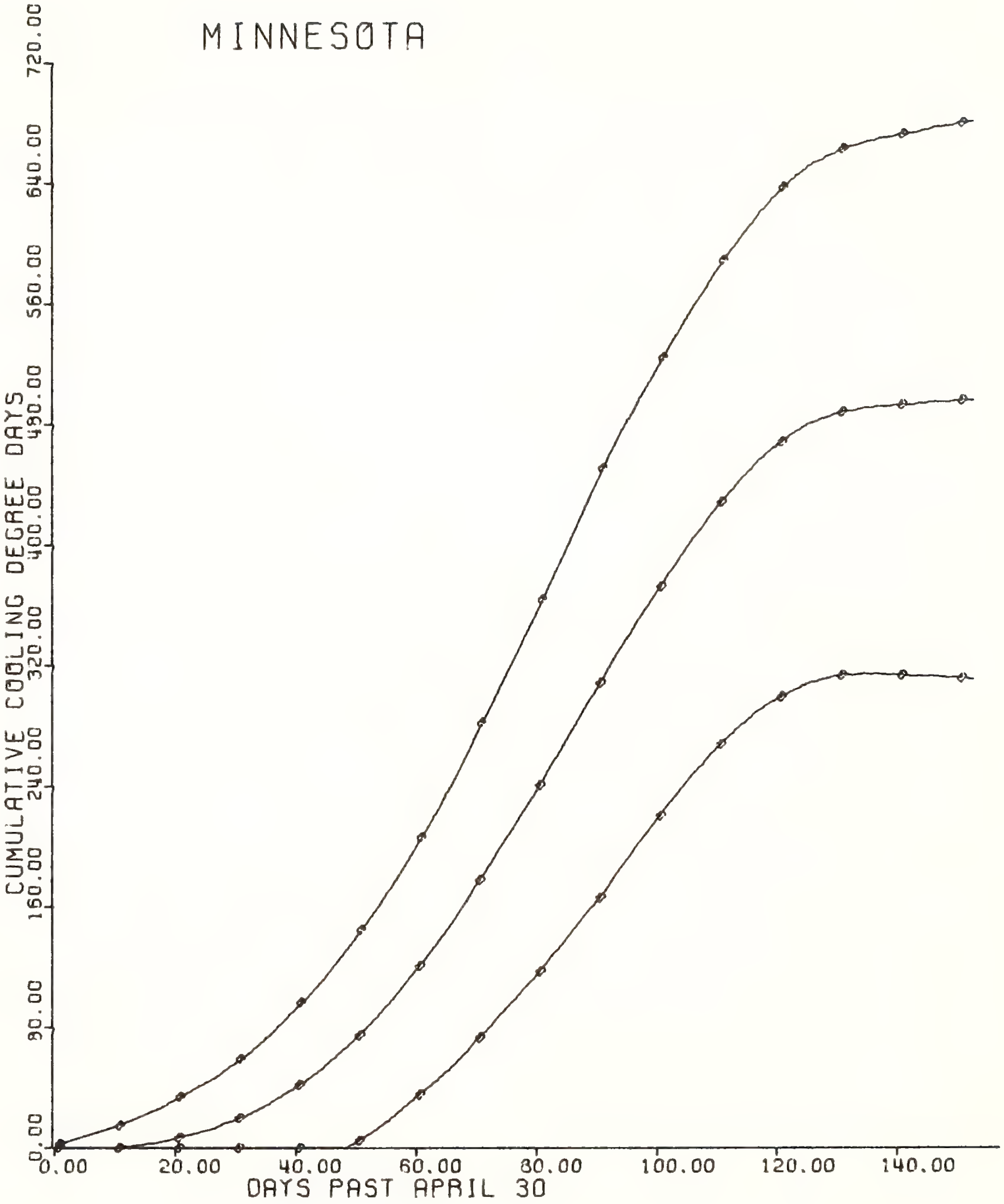
MICHIGAN



MINNESOTA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	14	8
20	0	6	32	16
30	0	18	56	23
40	0	39	92	32
50	2	71	140	42
60	32	116	200	51
70	69	172	275	63
80	112	234	356	74
90	161	302	443	86
100	216	367	518	92
110	264	424	584	97
120	298	466	634	103
130	314	488	662	106
140	315	494	673	109
150	313	497	681	112
153	312	497	682	113

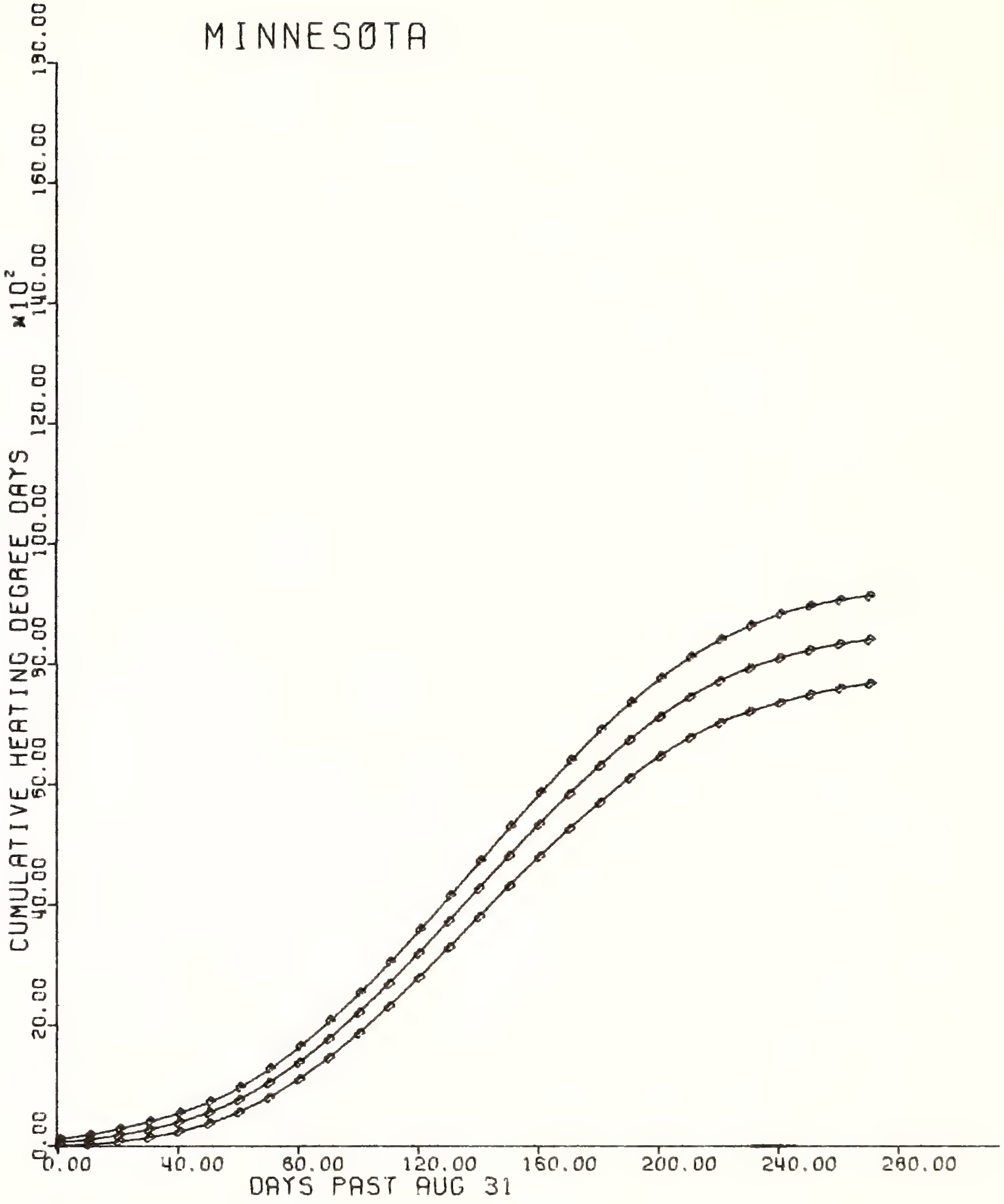
STATION	WEIGHT
FARGO, ND	.0470
SIOUX FALLS, SD	.0373
DULUTH	.0817
INTERNATIONAL FALLS	.0293
MINNEAPOLIS	.4967
ROCHESTER	.1540
ST. CLOUD	.1540



MINNESOTA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	19	98	177	48
20	60	166	272	64
30	126	259	392	81
40	219	376	533	96
50	350	532	714	111
60	533	740	947	126
70	770	1011	1252	147
80	1070	1345	1620	168
90	1423	1732	2041	189
100	1826	2166	2506	208
110	2268	2639	3010	226
120	2743	3145	3547	245
130	3242	3676	4110	264
140	3754	4220	4686	284
150	4265	4763	5261	304
160	4758	5292	5826	326
170	5225	5797	6369	349
180	5661	6271	6881	372
190	6075	6707	7339	385
200	6446	7097	7748	397
210	6762	7432	8102	409
220	7012	7705	8398	422
230	7207	7923	8639	437
240	7356	8096	8836	451
250	7493	8233	8973	452
260	7603	8339	9075	449
270	7685	8416	9147	446
273	7704	8434	9164	445

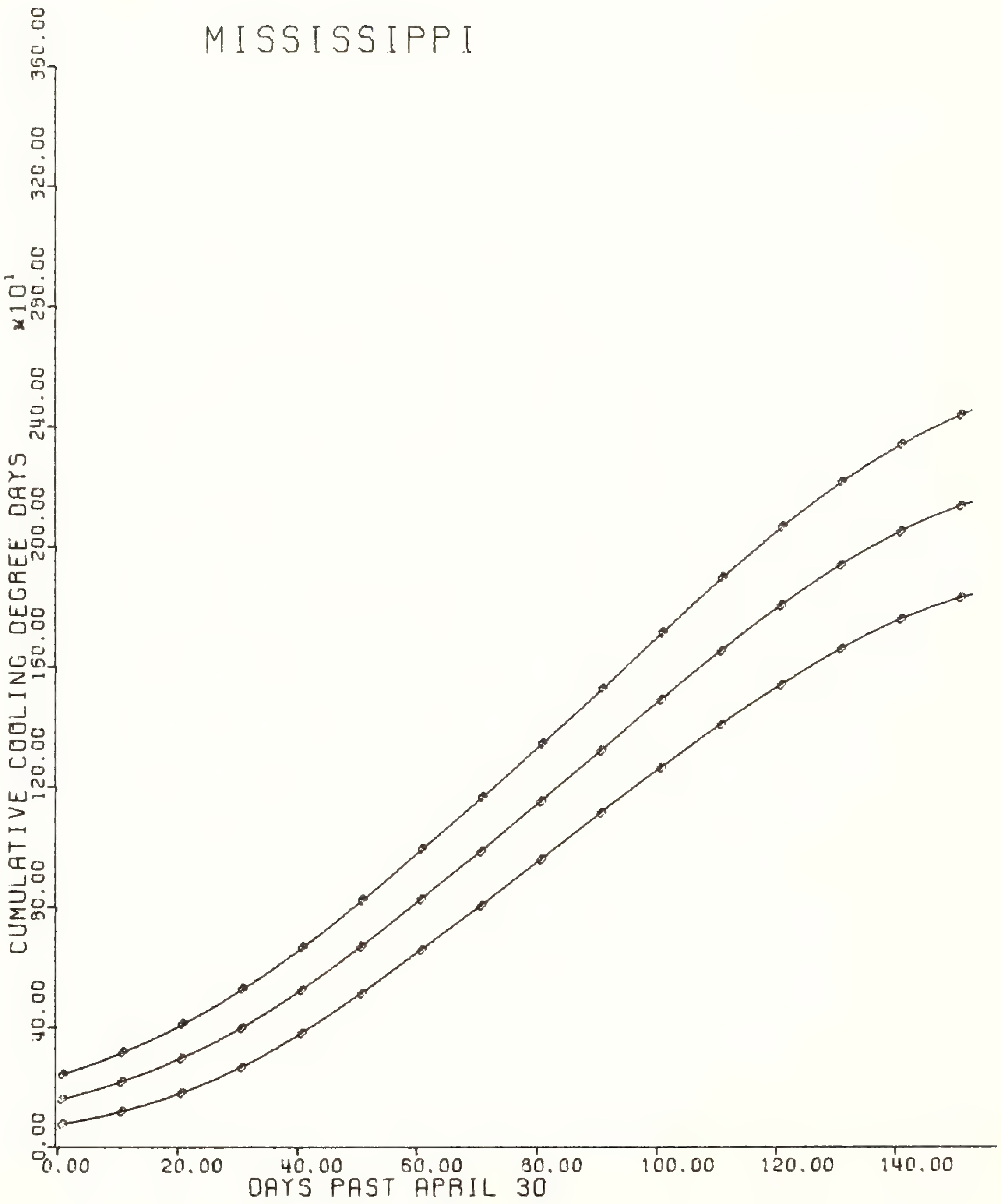
STATION	WEIGHT
FARGO, ND	.0470
SIOUX FALLS, SD	.0373
DULUTH	.0817
INTERNATIONAL FALLS	.0293
MINNEAPOLIS	.4967
ROCHESTER	.1540
ST. CLOUD	.1540



MISSISSIPPI
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	113	211	309	59
20	174	287	400	69
30	257	386	515	79
40	367	509	651	87
50	498	653	808	94
60	643	810	977	102
70	790	970	1150	110
80	943	1136	1329	118
90	1099	1305	1511	126
100	1250	1474	1698	136
110	1395	1638	1881	148
120	1529	1791	2053	160
130	1650	1927	2204	169
140	1750	2041	2332	177
150	1826	2130	2434	186
153	1841	2150	2459	188

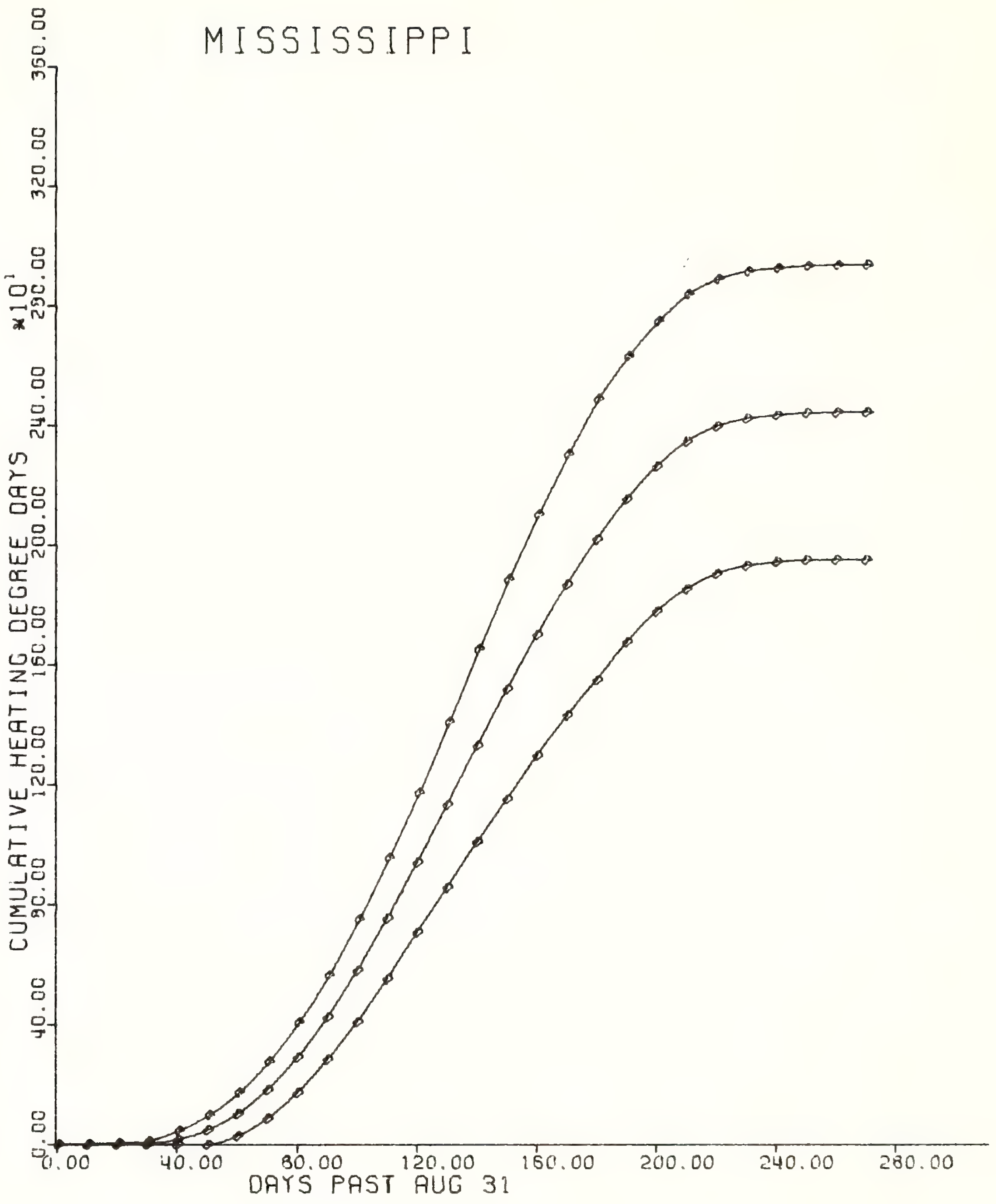
STATION	WEIGHT
MOBILE, AL	.1299
MEMPHIS, TN	.2246
JACKSON	.4299
MERIDIAN	.2156



MISSISSIPPI
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	2	1
20	0	0	5	3
30	0	2	9	4
40	0	15	43	17
50	0	44	94	30
60	24	95	166	43
70	80	173	266	57
80	163	279	395	71
90	271	410	549	85
100	396	565	734	103
110	539	738	937	122
120	693	923	1153	140
130	843	1115	1387	166
140	996	1313	1630	194
150	1140	1503	1866	221
160	1285	1685	2085	244
170	1421	1854	2287	264
180	1540	2007	2474	285
190	1666	2143	2620	291
200	1771	2256	2741	296
210	1850	2342	2834	300
220	1902	2395	2888	301
230	1932	2424	2916	300
240	1945	2436	2927	299
250	1953	2444	2935	300
260	1954	2446	2938	300
270	1954	2447	2940	301
273	1953	2447	2941	301

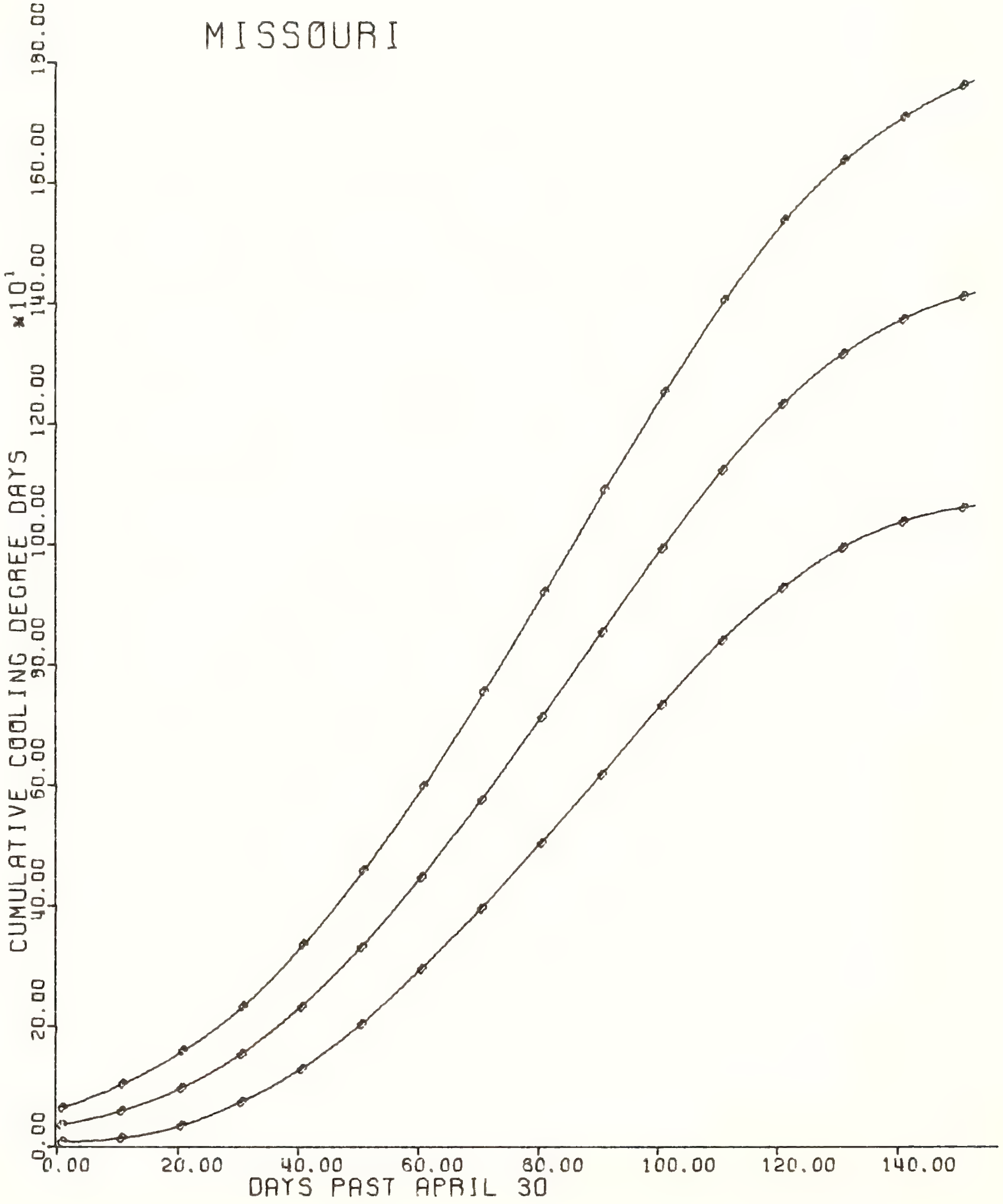
STATION	WEIGHT
MOBILE, AL	.1299
MEMPHIS, TN	.2246
JACKSON	.4299
MERIDIAN	.2156



MISSOURI
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	14	57	100	26
20	33	93	153	37
30	70	148	226	47
40	124	225	326	62
50	196	321	446	76
60	286	436	586	91
70	385	563	741	108
80	495	701	907	125
90	608	842	1076	143
100	724	982	1240	157
110	833	1113	1393	171
120	921	1224	1527	185
130	991	1311	1631	195
140	1036	1371	1706	204
150	1062	1411	1760	213
153	1066	1420	1774	216

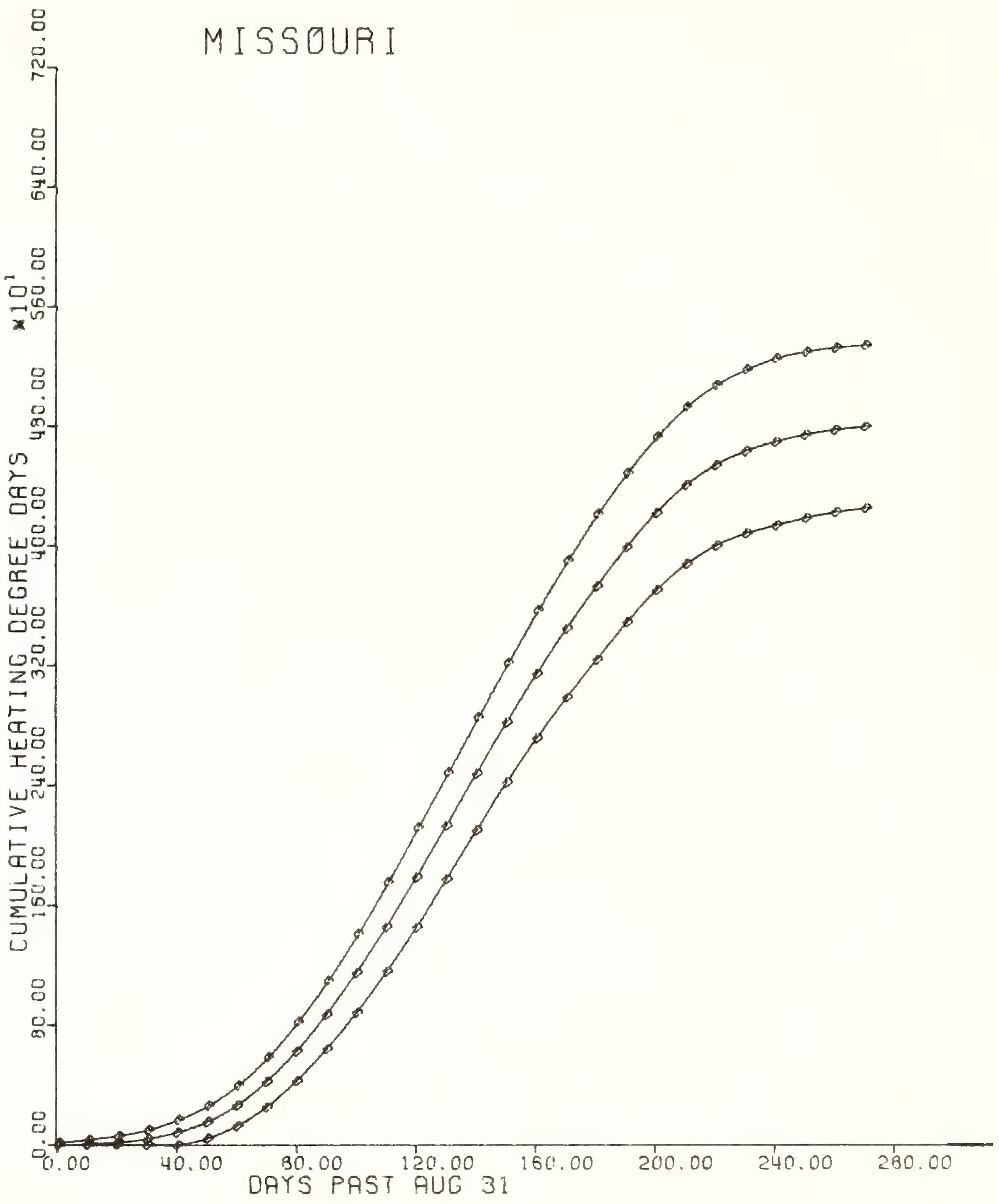
STATION	WEIGHT
CAIRO, IL	.0669
COLUMBIA	.0808
KANSAS CITY	.3045
ST. LOUIS	.4137
SPRINGFIELD	.1341



MISSOURI
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	4	32	17
20	0	15	58	26
30	0	37	95	35
40	0	77	160	51
50	34	143	252	66
60	115	249	383	82
70	236	401	566	100
80	407	602	797	119
90	617	843	1069	138
100	859	1120	1381	159
110	1130	1426	1722	180
120	1424	1755	2086	202
130	1743	2098	2453	216
140	2071	2447	2823	229
150	2391	2788	3185	242
160	2689	3114	3539	259
170	2965	3419	3873	277
180	3219	3703	4187	295
190	3467	3966	4465	305
200	3686	4199	4712	313
210	3865	4391	4917	321
220	3994	4531	5068	328
230	4080	4628	5176	334
240	4136	4695	5254	341
250	4186	4743	5300	339
260	4227	4778	5329	336
270	4255	4801	5347	333
273	4261	4806	5351	332

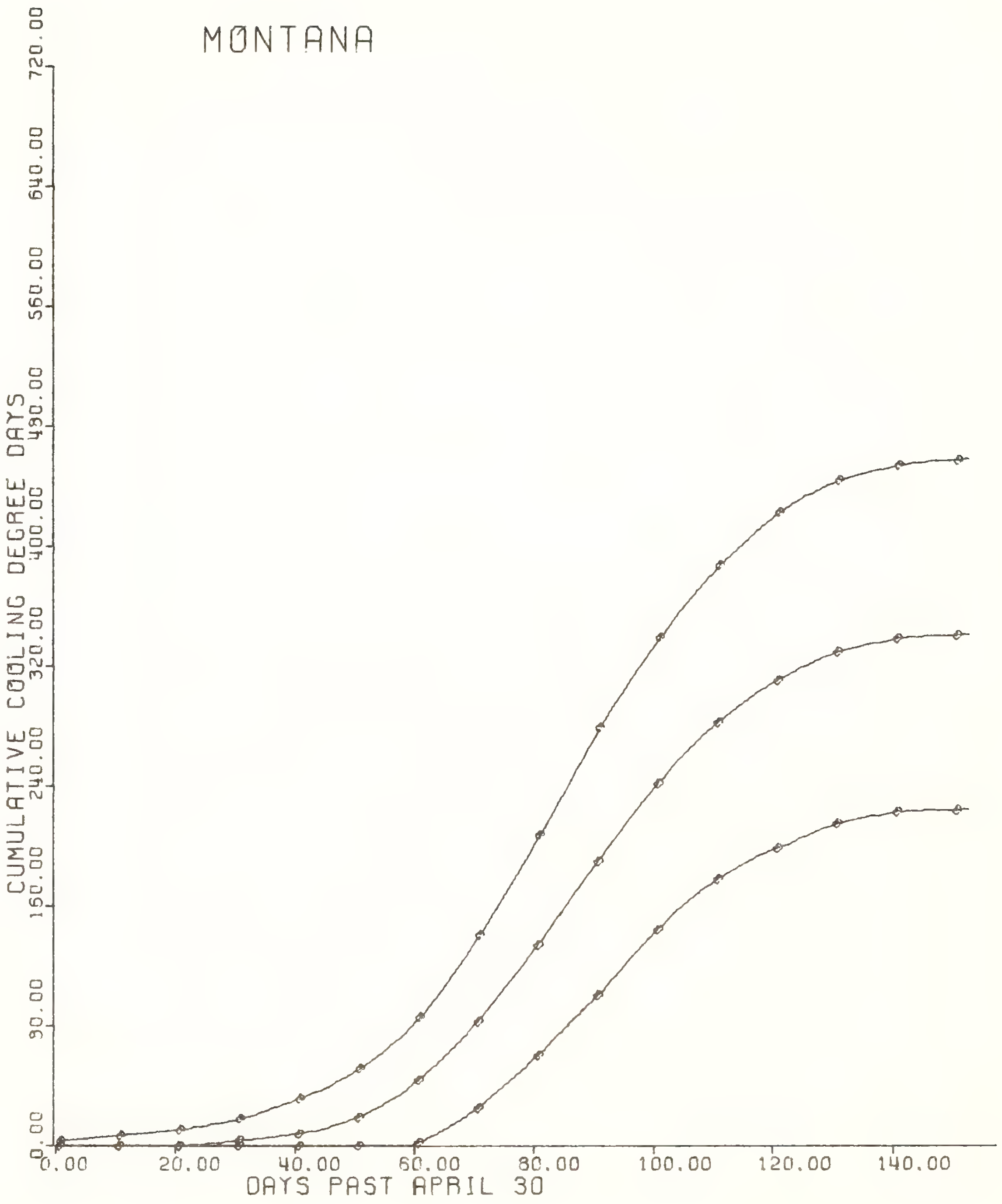
STATION	WEIGHT
CAIRO, IL	.0669
COLUMBIA	.0808
KANSAS CITY	.3045
ST. LOUIS	.4137
SPRINGFIELD	.1341



MONTANA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	7	4
20	0	0	10	6
30	0	3	17	8
40	0	8	31	14
50	0	18	50	19
60	0	41	82	25
70	23	79	135	34
80	57	129	201	44
90	96	164	272	54
100	140	237	334	59
110	175	279	383	64
120	198	309	420	68
130	214	328	442	70
140	222	338	454	70
150	224	341	458	71
153	225	342	459	71

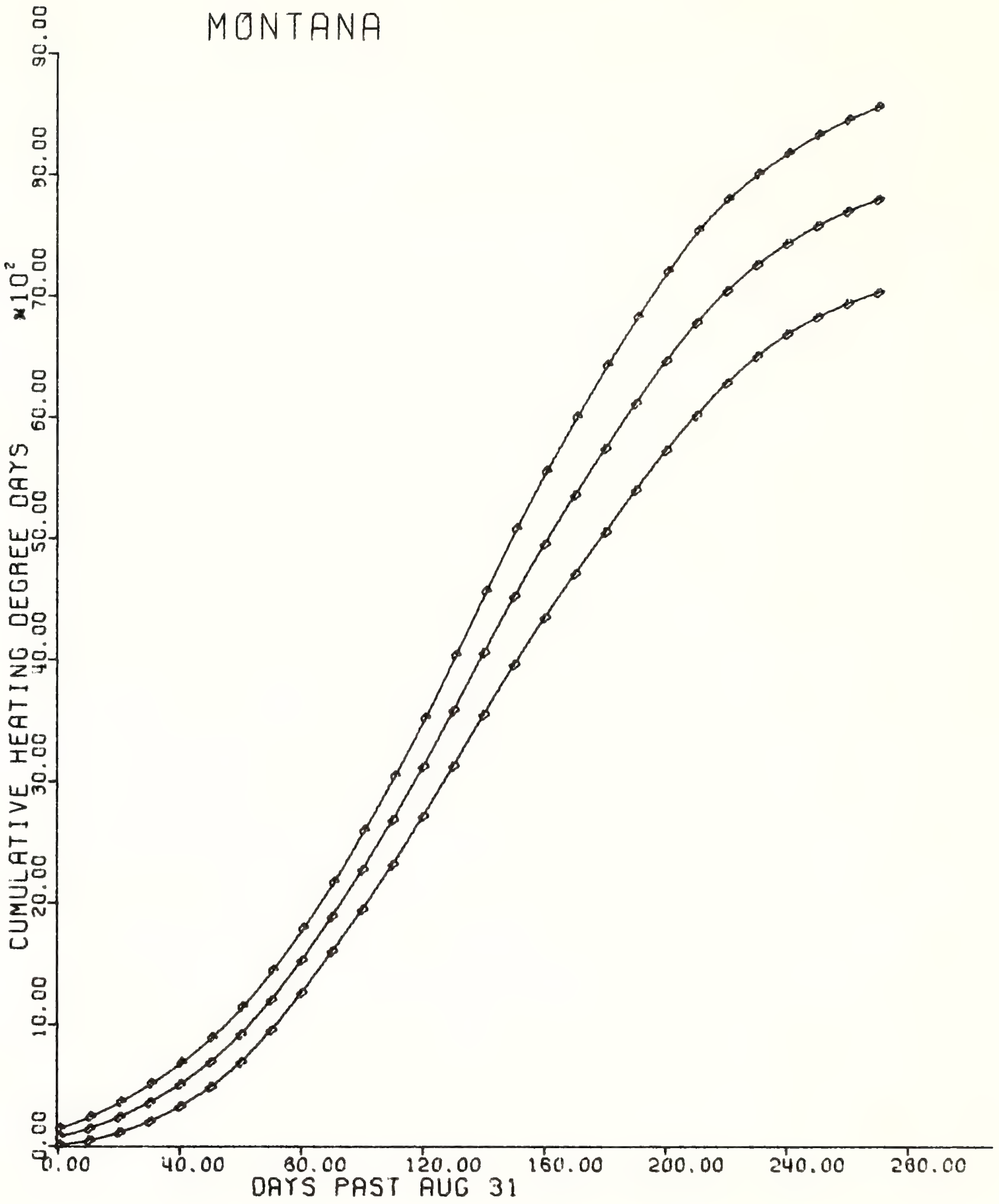
STATION	WEIGHT
BILLINGS	.1787
GLASGOW	.0807
GREAT FALLS	.2061
HAVRE	.0980
HELENA	.1340
KALISPELL	.0821
MILES CITY	.0432
MISSOULA	.1772



MONTANA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	43	138	233	58
20	105	230	355	76
30	194	348	502	94
40	314	493	672	109
50	469	672	875	124
60	668	896	1124	139
70	926	1174	1422	151
80	1230	1497	1764	163
90	1567	1854	2141	175
100	1913	2237	2561	198
110	2280	2644	3008	222
120	2674	3078	3482	246
130	3086	3540	3994	277
140	3509	4015	4521	309
150	3923	4461	5039	341
160	4312	4916	5520	368
170	4676	5322	5963	394
180	5022	5710	6398	420
190	5371	6085	6799	436
200	5701	6439	7177	450
210	5995	6758	7521	465
220	6263	7026	7789	465
230	6490	7246	8002	461
240	6677	7427	8177	457
250	6822	7577	8332	460
260	6937	7699	8461	464
270	7032	7800	8568	469
273	7055	7826	8597	470

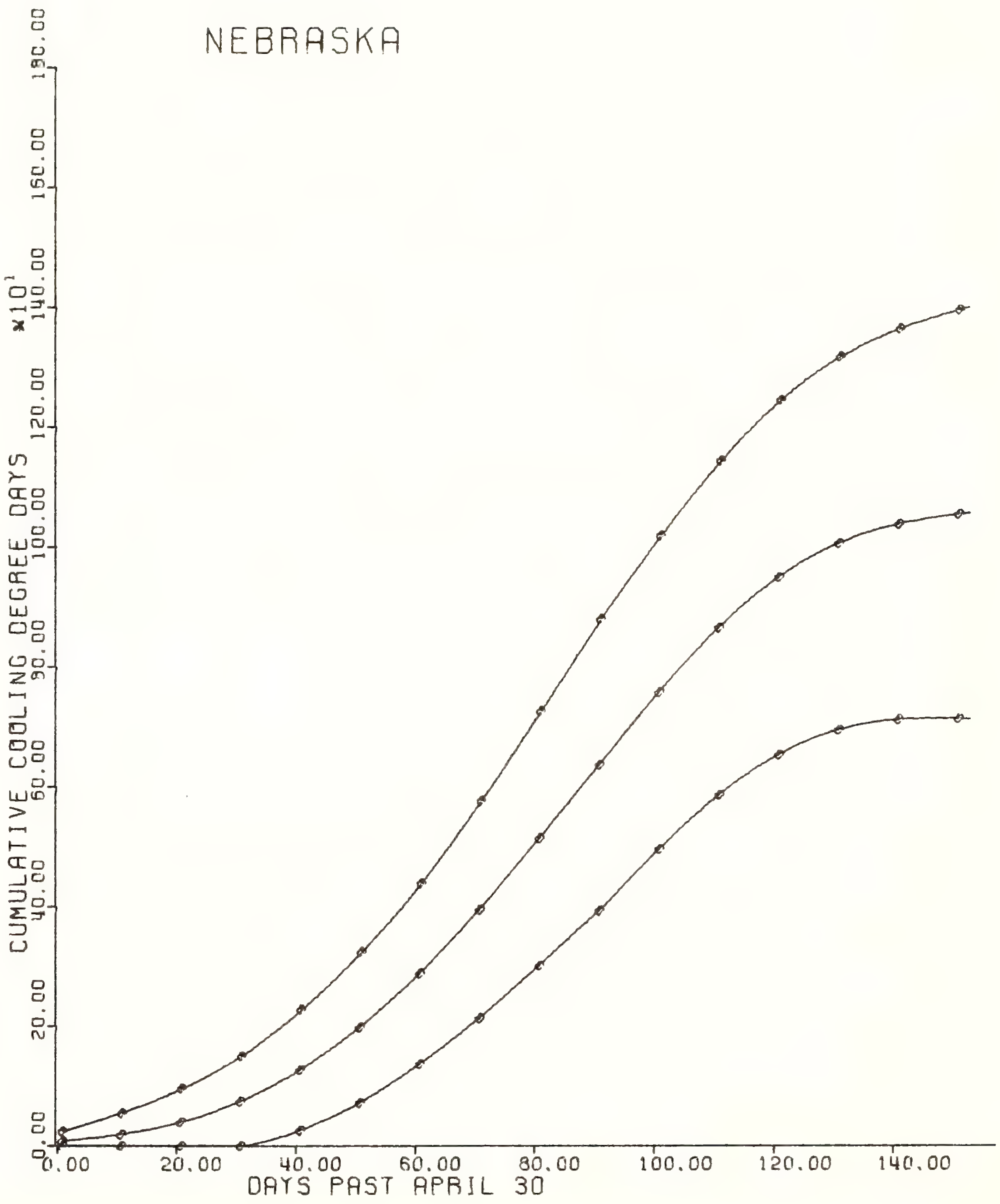
STATION	WEIGHT
BILLINGS	.1787
GLASGOW	.0807
GREAT FALLS	.2061
HAVRE	.0980
HELENA	.1340
KALISPELL	.0821
MILES CITY	.0432
MISSOULA	.1772



NEBRASKA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	18	52	21
20	0	37	91	33
30	0	70	144	45
40	21	120	219	60
50	66	190	314	75
60	129	278	427	91
70	205	384	563	109
80	293	502	711	128
90	384	624	864	146
100	486	746	1006	159
110	579	856	1133	169
120	649	943	1237	180
130	693	1003	1313	189
140	712	1037	1362	198
150	715	1055	1395	207
153	714	1058	1402	210

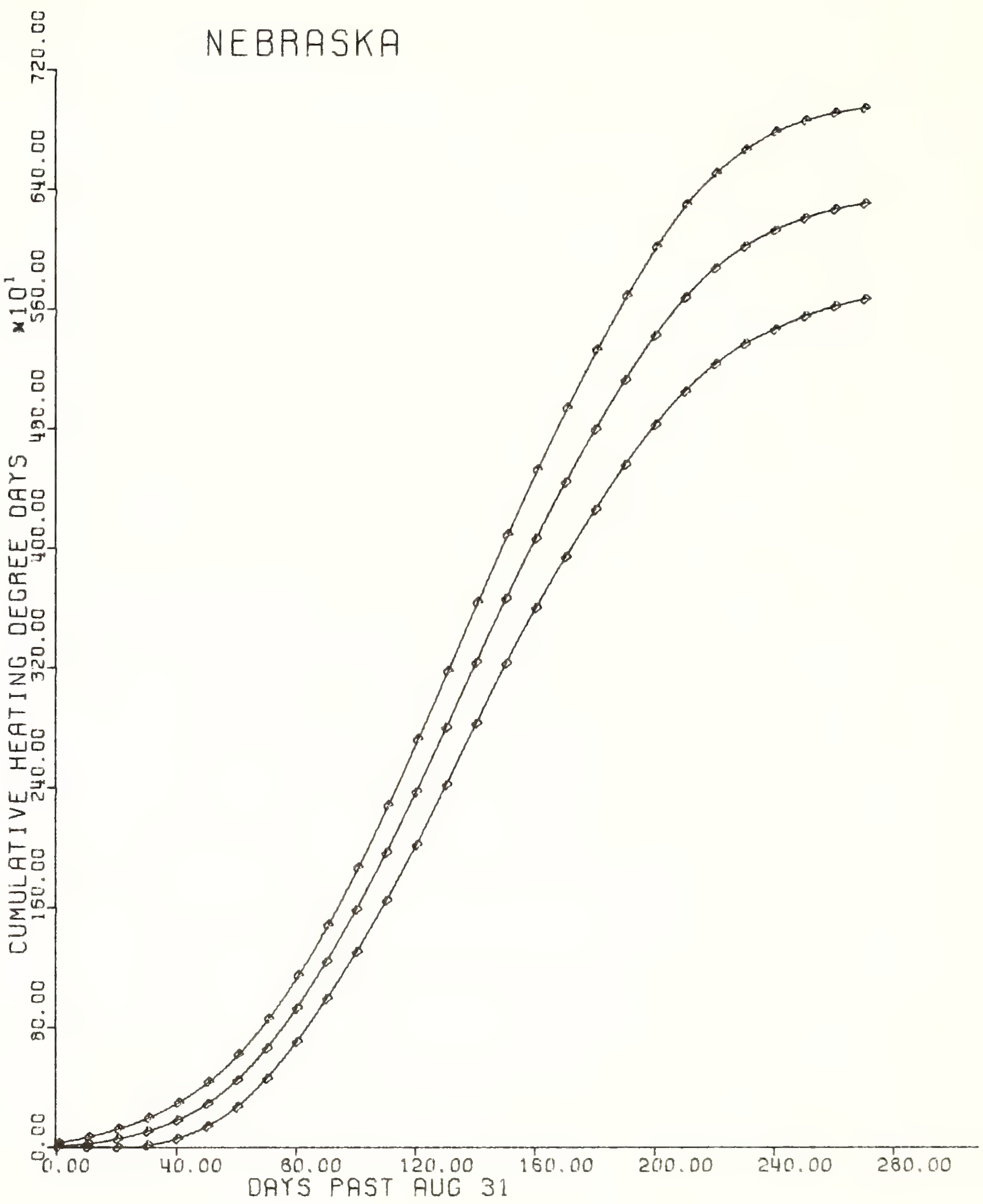
STATION	WEIGHT
GRAND ISLAND	.1349
LINCOLN	.2812
NORFOLK	.0958
NORTH PLATTE	.1113
OMAHA	.3492
VALENTINE	.0276



NEBRASKA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	21	65	27
20	0	52	119	41
30	10	100	190	55
40	53	171	289	72
50	130	276	422	89
60	254	428	602	106
70	439	637	835	121
80	678	899	1120	135
90	963	1207	1451	149
100	1272	1551	1830	170
110	1614	1928	2242	192
120	1982	2332	2682	213
130	2361	2758	3135	230
140	2789	3192	3595	246
150	3192	3620	4048	261
160	3565	4026	4487	281
170	3909	4405	4901	303
180	4229	4761	5293	324
190	4532	5095	5658	343
200	4804	5397	5990	362
210	5031	5655	6279	380
220	5219	5858	6497	389
230	5359	6009	6659	396
240	5459	6120	6781	403
250	5547	6204	6861	400
260	5616	6265	6914	396
270	5666	6307	6948	391
273	5677	6315	6953	389

STATION	WEIGHT
GRAND ISLAND	.1349
LINCOLN	.2812
NORFOLK	.0958
NORTH PLATTE	.1113
OMAHA	.3492
VALENTINE	.0276

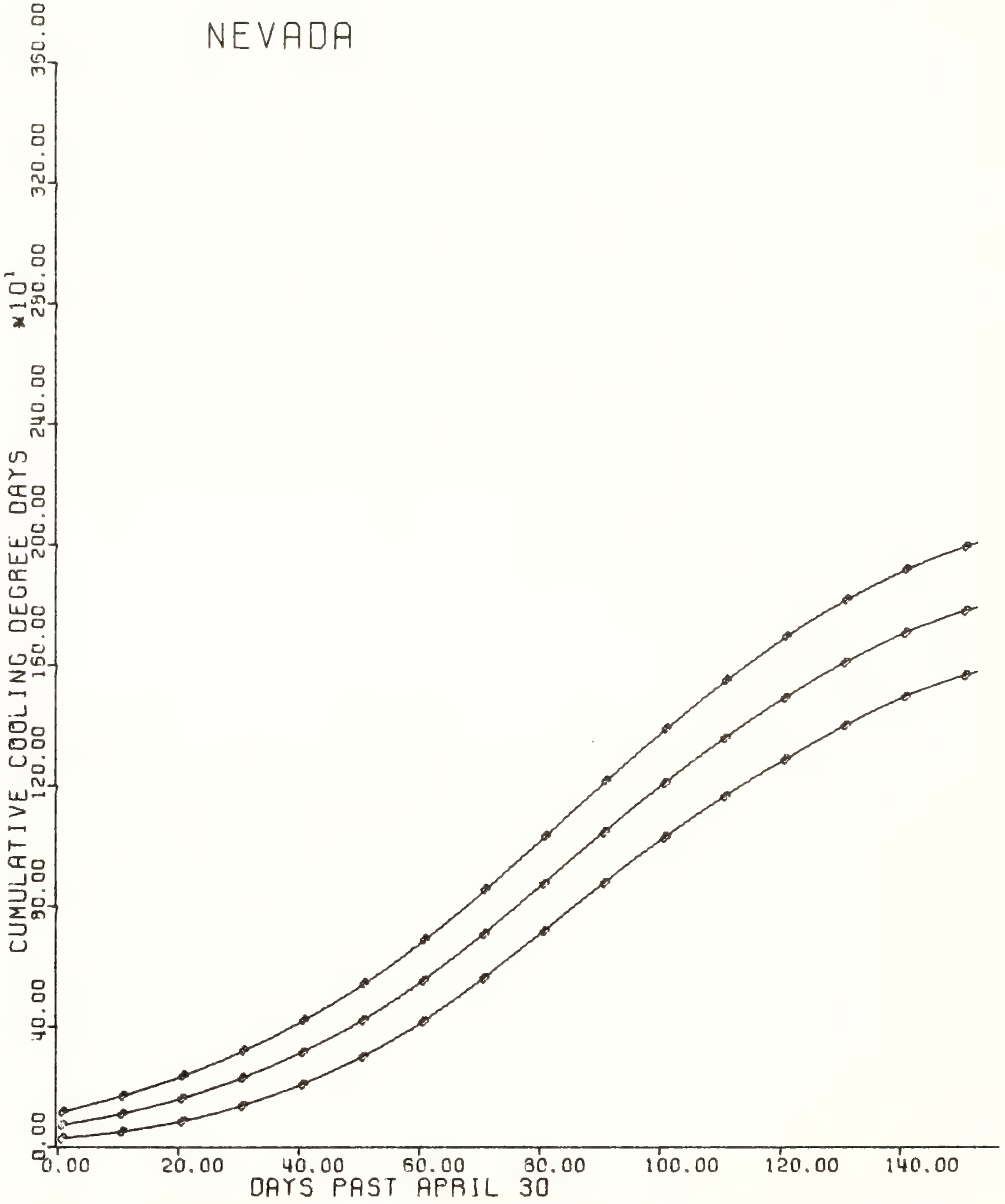


NEVADA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	50	108	166	36
20	83	157	231	45
30	133	223	313	55
40	202	307	412	64
50	292	412	532	73
60	405	540	675	82
70	547	693	839	89
80	703	860	1017	96
90	864	1032	1200	103
100	1015	1195	1375	110
110	1153	1345	1537	117
120	1278	1481	1684	124
130	1392	1601	1810	127
140	1490	1701	1912	129
150	1564	1778	1992	131
153	1581	1796	2011	131

STATION	WEIGHT
ELY	.0573
LAS VEGAS	.5910
RENO	.3108
WINNEMUCCA	.0409

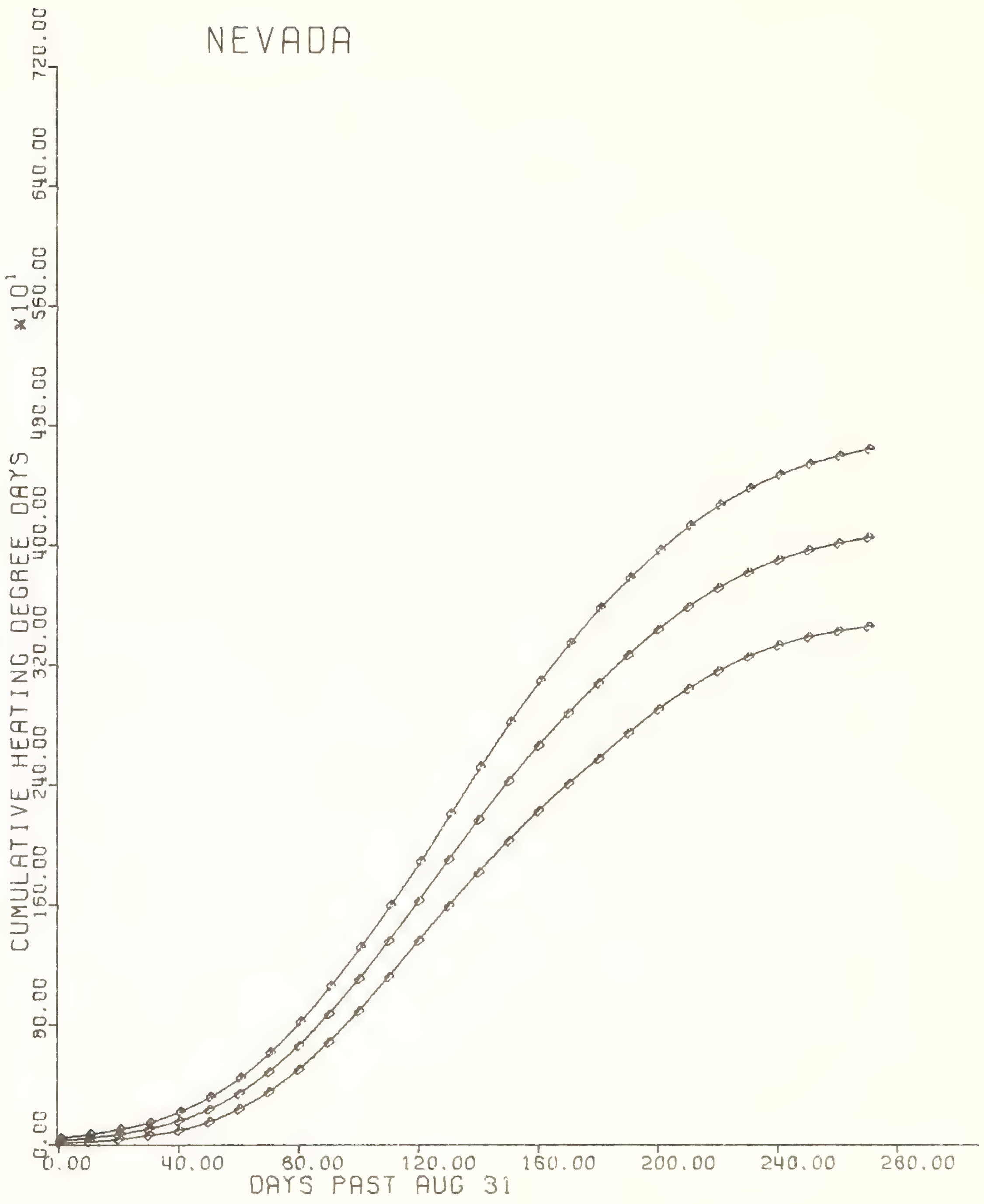
NEVADA



NEVADA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	20	44	68	15
20	35	68	101	20
30	61	103	145	26
40	91	154	217	38
50	145	228	311	51
60	227	331	435	63
70	339	470	601	80
80	486	645	804	97
90	665	852	1039	114
100	871	1084	1297	130
110	1099	1337	1575	145
120	1339	1603	1867	161
130	1573	1878	2183	186
140	1798	2147	2496	213
150	2011	2405	2799	240
160	2211	2643	3075	263
170	2394	2861	3328	285
180	2561	3063	3565	306
190	2732	3250	3768	316
200	2892	3424	3956	324
210	3030	3576	4122	333
220	3151	3706	4261	339
230	3250	3814	4378	344
240	3326	3898	4470	349
250	3384	3964	4544	353
260	3426	4013	4600	358
270	3458	4052	4646	362
273	3466	4063	4660	364

STATION	WEIGHT
ELY	.0573
LAS VEGAS	.5910
RENO	.3108
WINNEMUCCA	.0409



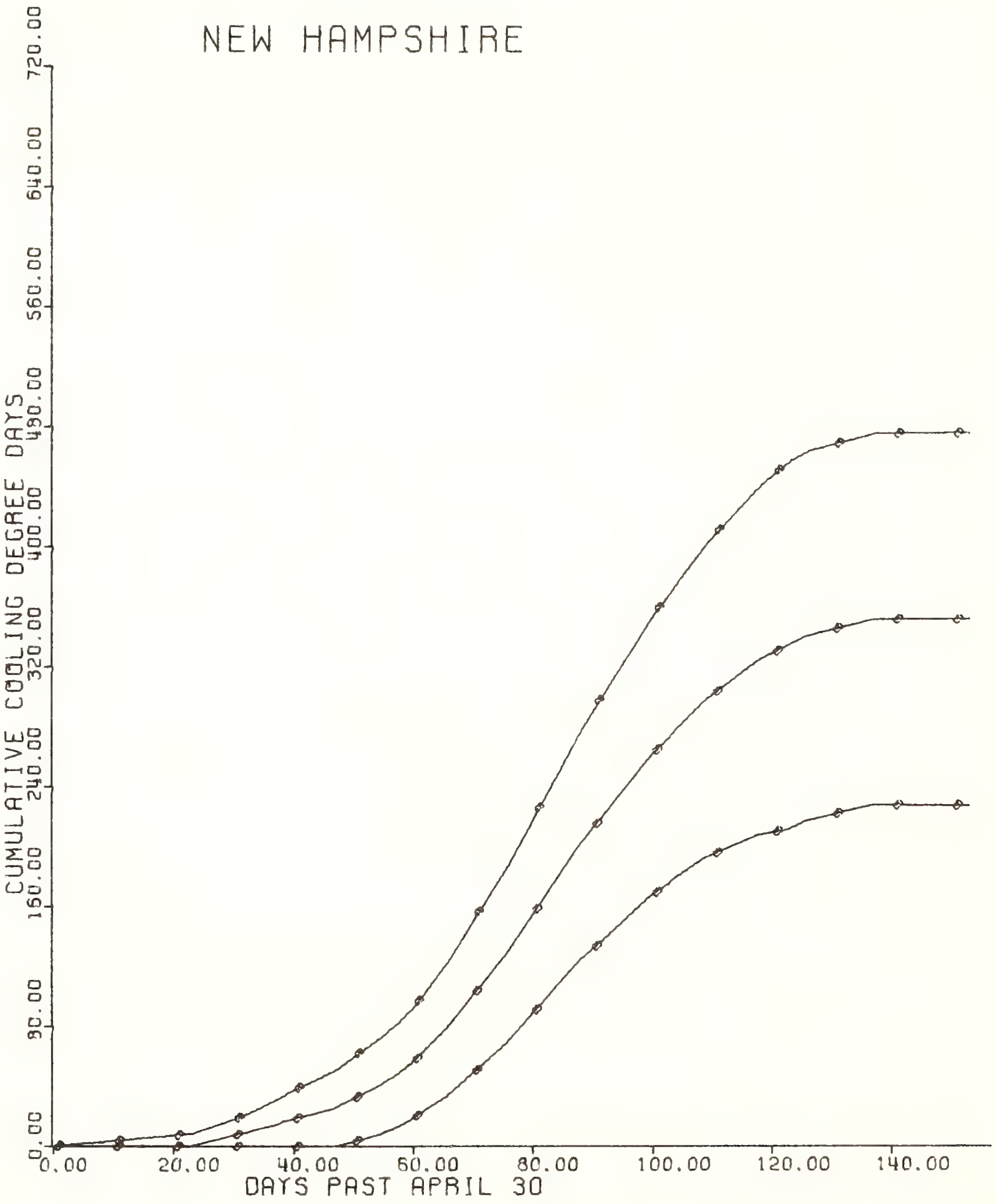
NEVADA

NEW HAMPSHIRE
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	4	2
20	0	0	7	4
30	0	7	18	7
40	0	18	37	12
50	3	31	59	17
60	18	55	92	23
70	48	99	150	31
80	87	153	219	40
90	131	211	291	49
100	167	261	355	57
110	195	301	407	65
120	210	329	448	73
130	222	345	468	75
140	228	352	476	75
150	228	352	476	76
153	228	352	476	76

STATION	WEIGHT
BURLINGTON, VT	.0664
CONCORD	.9336

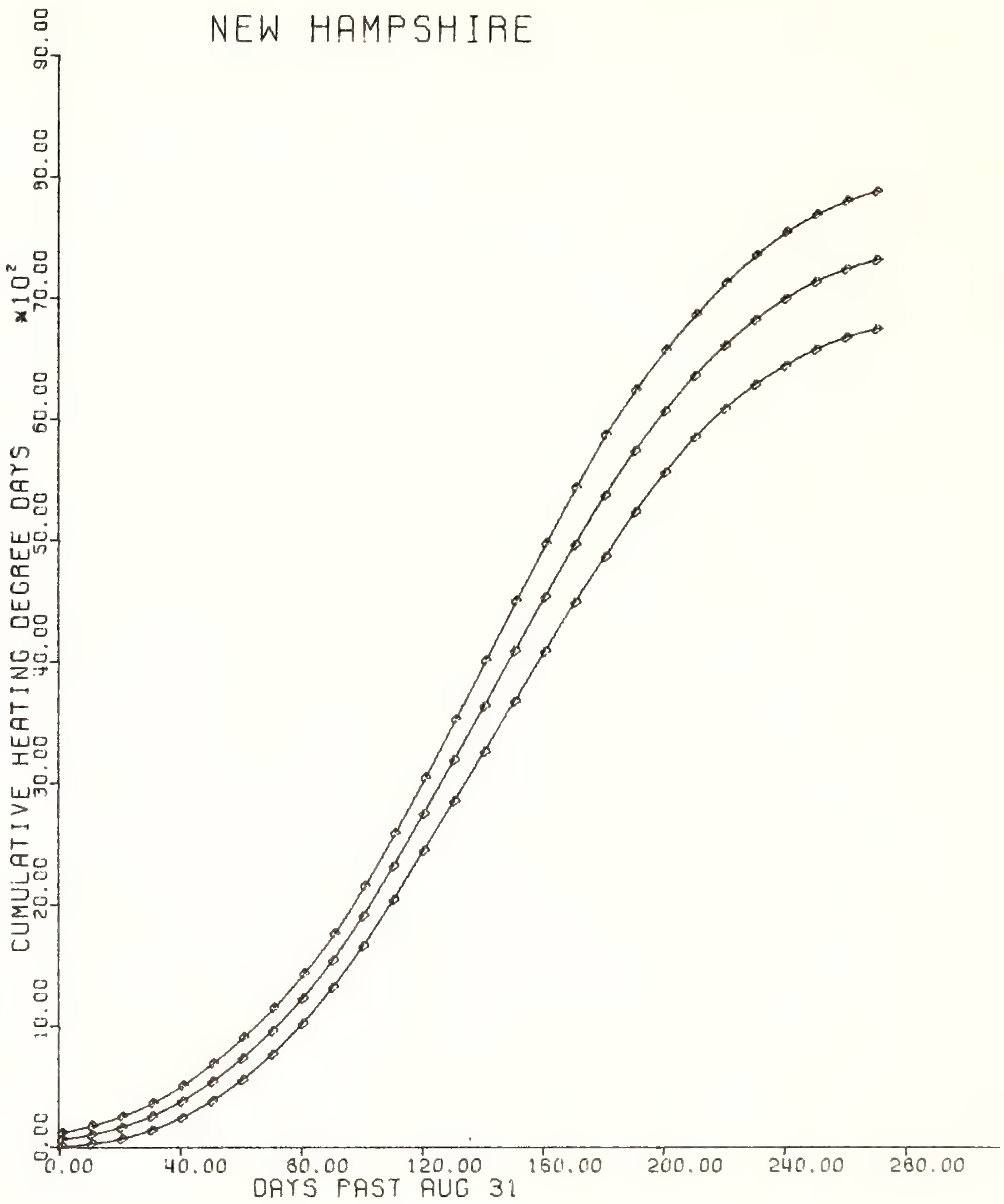
NEW HAMPSHIRE



NEW HAMPSHIRE
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	26	99	172	44
20	65	157	249	56
30	134	244	354	67
40	234	366	498	80
50	369	522	675	93
60	536	711	886	107
70	746	936	1126	116
80	993	1199	1405	125
90	1289	1510	1731	135
100	1626	1872	2118	150
110	2004	2276	2548	166
120	2407	2706	3005	182
130	2814	3148	3482	204
140	3221	3593	3965	227
150	3636	4045	4454	250
160	4046	4488	4930	270
170	4450	4923	5396	288
180	4831	5334	5837	307
190	5201	5708	6215	309
200	5536	6043	6550	309
210	5831	6339	6847	310
220	6074	6594	7114	317
230	6275	6810	7345	326
240	6438	6988	7538	335
250	6575	7132	7689	340
260	6677	7240	7803	343
270	6750	7318	7886	346
273	6765	7335	7905	347

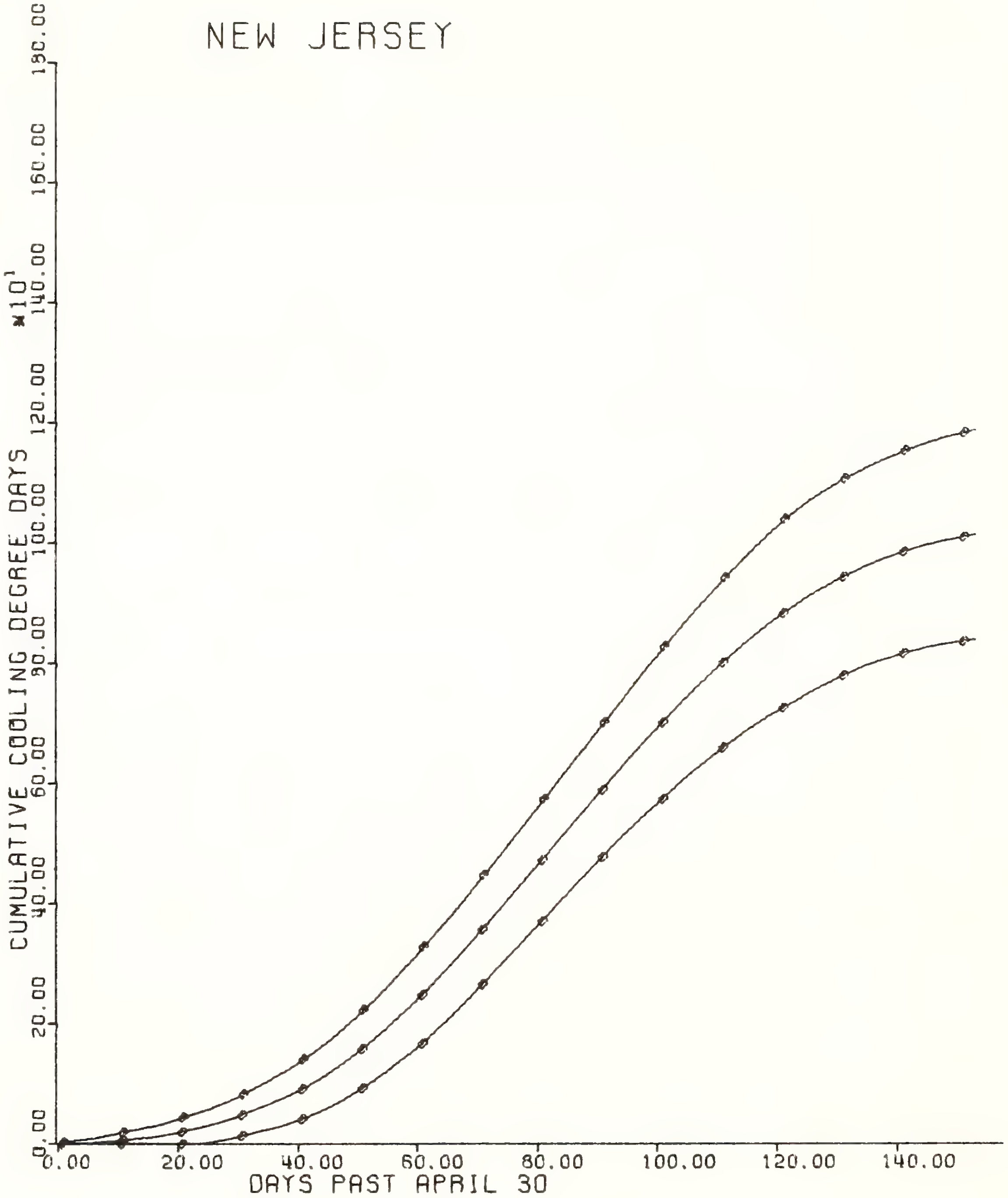
STATION	WEIGHT
BURLINGTON, VT	.0664
CONCORD	.9336



NEW JERSEY
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	5	17	7
20	0	18	41	14
30	10	44	78	21
40	37	86	135	30
50	86	150	214	39
60	159	238	317	48
70	255	345	435	55
80	360	461	562	61
90	468	579	690	68
100	566	691	816	76
110	652	792	932	86
120	720	876	1032	95
130	777	940	1103	100
140	815	983	1151	103
150	837	1010	1183	106
153	841	1016	1191	107

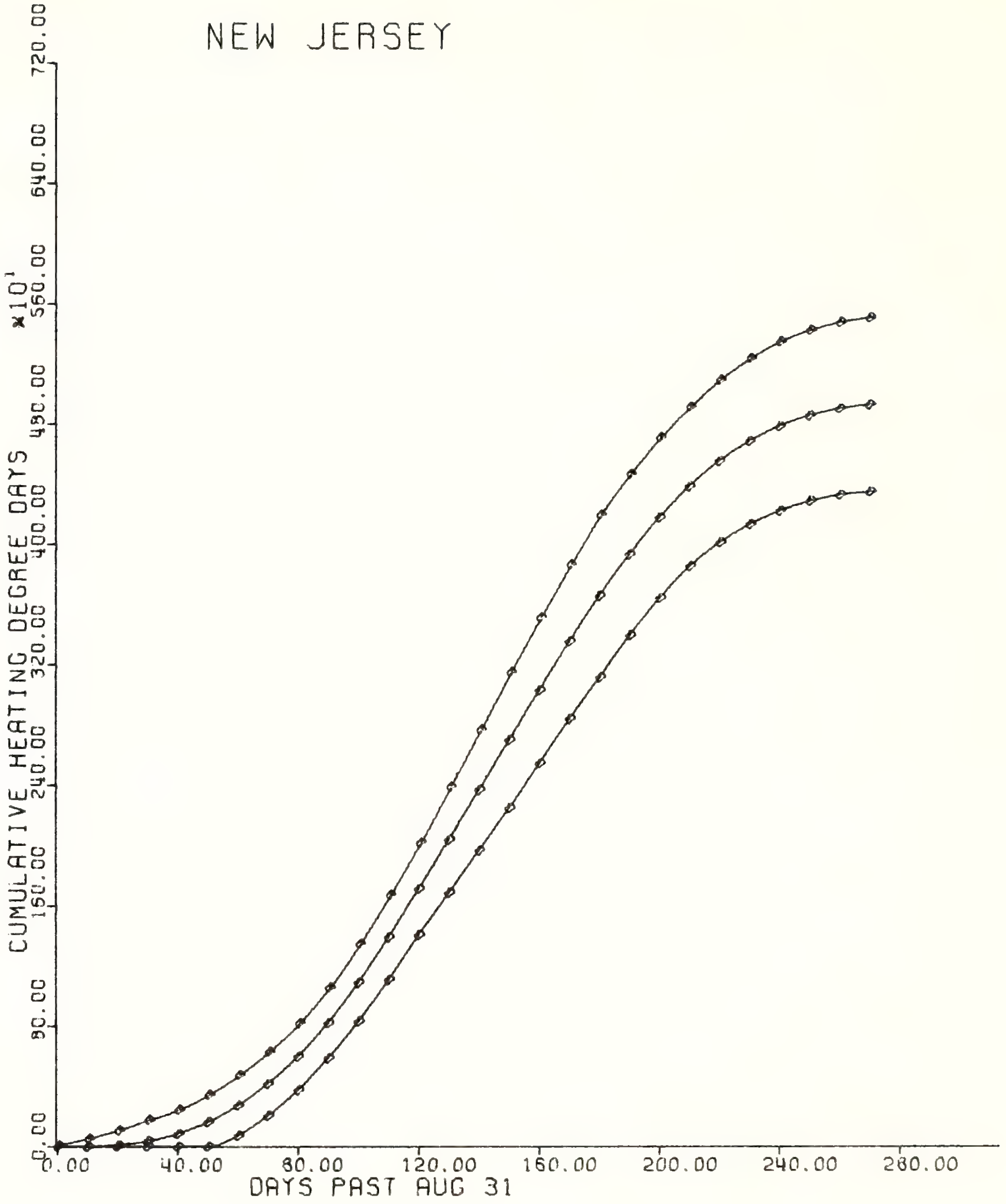
STATION	WEIGHT
ALLENTOWN, PA	.0310
NEW YORK CITY, NY	.5610
PHILADELPHIA, PA	.1708
ATLANTIC CITY	.0402
TRENTON	.1970



NEW JERSEY
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	1	51	30
20	0	10	104	57
30	0	35	173	84
40	0	61	240	97
50	0	155	335	110
60	61	262	463	122
70	189	402	615	130
80	355	579	803	136
90	563	798	1033	143
100	806	1063	1320	157
110	1081	1362	1643	171
120	1377	1681	1985	186
130	1658	2007	2356	213
140	1940	2338	2736	242
150	2222	2669	3116	272
160	2517	2999	3481	294
170	2813	3323	3833	311
180	3090	3629	4168	329
190	3369	3908	4447	329
200	3620	4156	4692	327
210	3835	4368	4901	325
220	3999	4541	5083	330
230	4125	4676	5231	337
240	4216	4781	5346	344
250	4284	4855	5426	348
260	4329	4904	5479	351
270	4352	4932	5512	354
273	4357	4938	5519	354

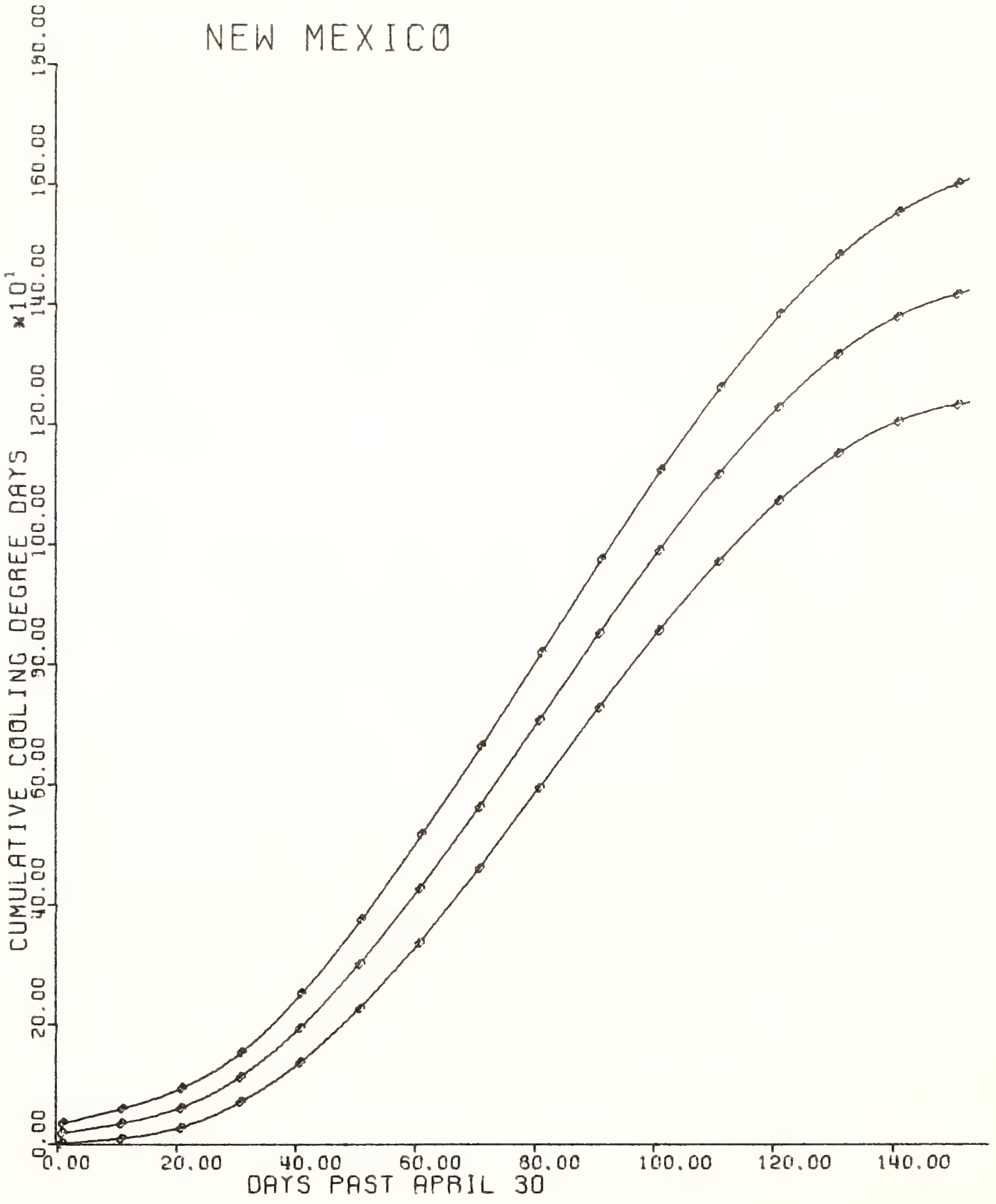
STATION	WEIGHT
ALLENTOWN, PA	.0310
NEW YORK CITY, NY	.5610
PHILADELPHIA, PA	.1708
ATLANTIC CITY	.0402
TRENTON	.1970


NEW JERSEY

NEW MEXICO
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	9	33	57	15
20	26	58	90	20
30	66	106	146	25
40	129	185	241	34
50	218	291	364	44
60	325	414	503	54
70	449	550	651	61
80	583	694	805	68
90	717	839	961	74
100	845	978	1111	81
110	962	1106	1250	88
120	1064	1219	1374	94
130	1146	1311	1476	100
140	1203	1377	1551	106
150	1233	1417	1601	112
153	1239	1426	1613	114

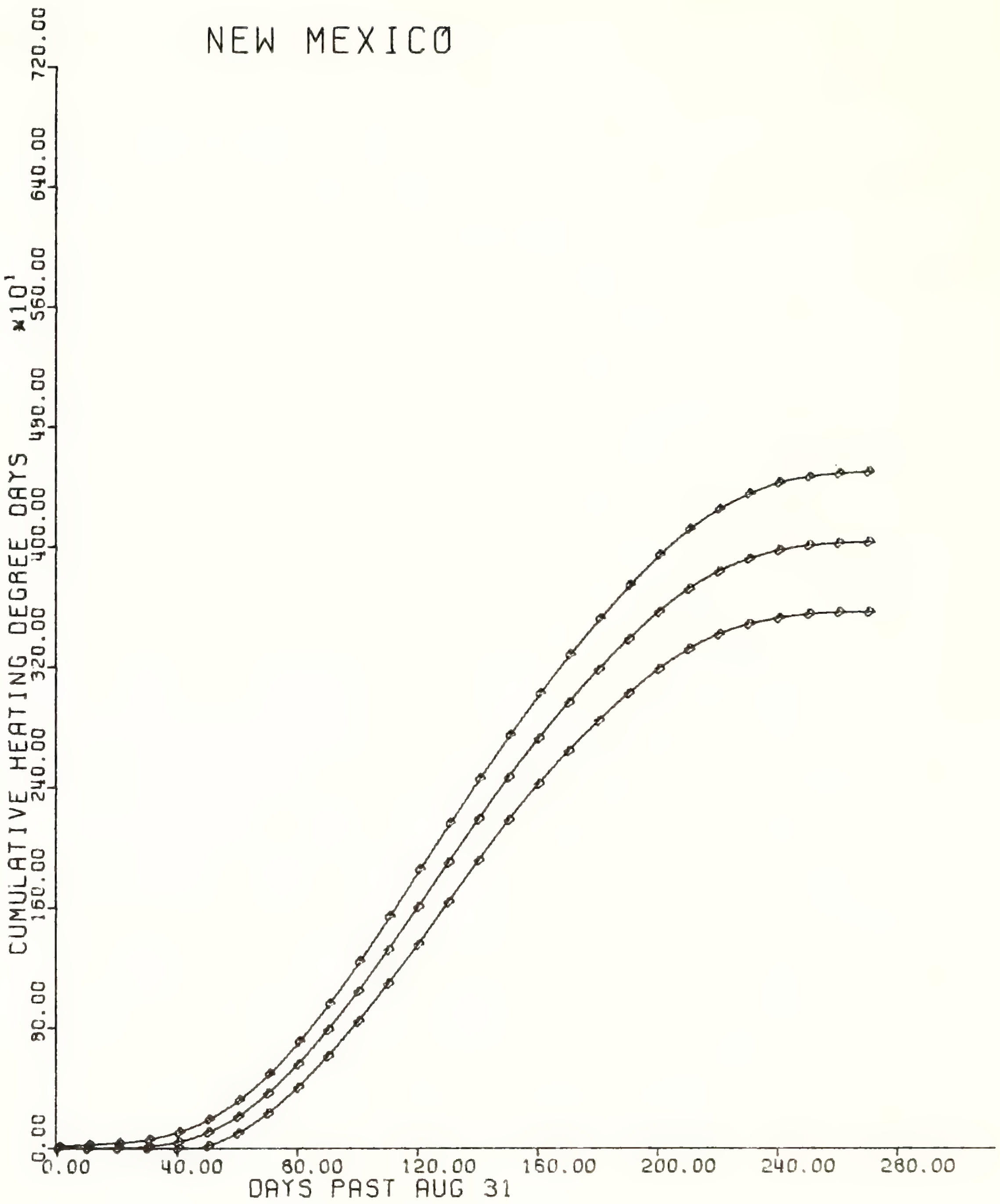
STATION	WEIGHT
WINSLOW, AZ	.0994
AMARILLO, TX	.0778
EL PASO, TX	.1240
ALBUQUERQUE	.5581
ROSWELL	.1407



NEW MEXICO
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	22	13
20	0	1	34	20
30	0	10	54	27
40	0	37	102	40
50	10	97	184	53
60	90	198	306	66
70	217	347	477	79
80	386	538	690	93
90	591	765	939	106
100	821	1020	1219	121
110	1070	1294	1518	136
120	1332	1581	1830	152
130	1614	1876	2138	160
140	1893	2165	2437	166
150	2162	2444	2726	172
160	2405	2704	3003	182
170	2626	2944	3262	194
180	2828	3165	3502	206
190	3013	3371	3729	218
200	3177	3555	3933	230
210	3312	3710	4108	243
220	3415	3831	4247	254
230	3485	3918	4351	264
240	3529	3979	4429	275
250	3556	4014	4472	279
260	3570	4032	4494	282
270	3573	4040	4507	285
273	3573	4041	4509	286

STATION	WEIGHT
WINSLOW, AZ	.0994
AMARILLO, TX	.0778
EL PASO, TX	.1240
ALBUQUERQUE	.5581
ROSWELL	.1407

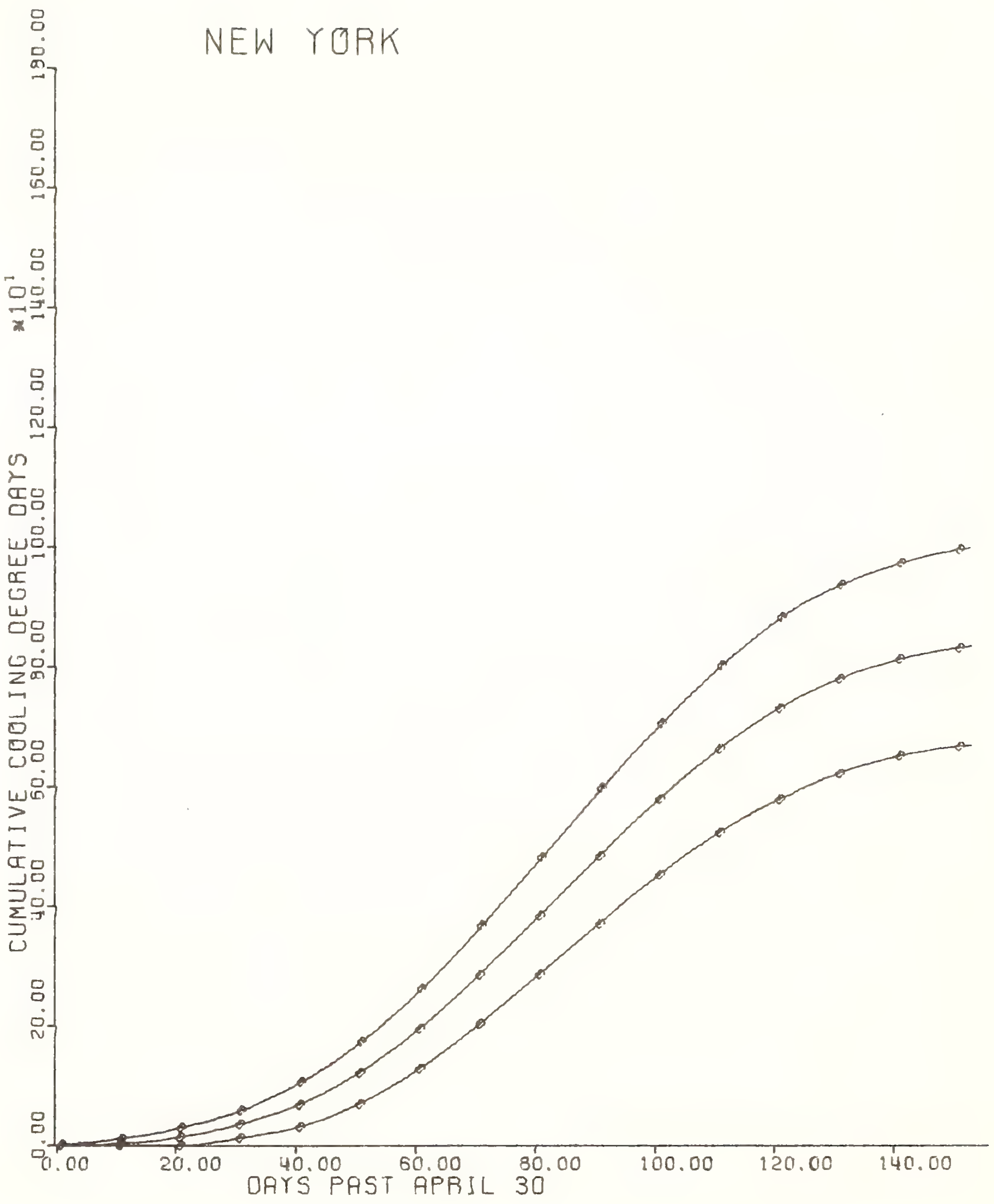


NEW YORK
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	3	11	5
20	0	13	28	9
30	11	33	55	14
40	29	65	101	22
50	65	116	167	31
60	122	188	254	40
70	195	276	357	49
80	278	375	472	59
90	363	475	587	68
100	445	571	697	77
110	518	656	794	84
120	575	726	877	92
130	619	777	935	96
140	650	811	972	98
150	667	832	997	100
153	670	836	1002	101

STATION	WEIGHT
BURLINGTON, VT	.0223
ALBANY	.0672
BINGHAMTON	.0654
BUFFALO	.0820
NEW YORK CITY	.6345
ROCHESTER	.0602
SYRACUSE	.0684

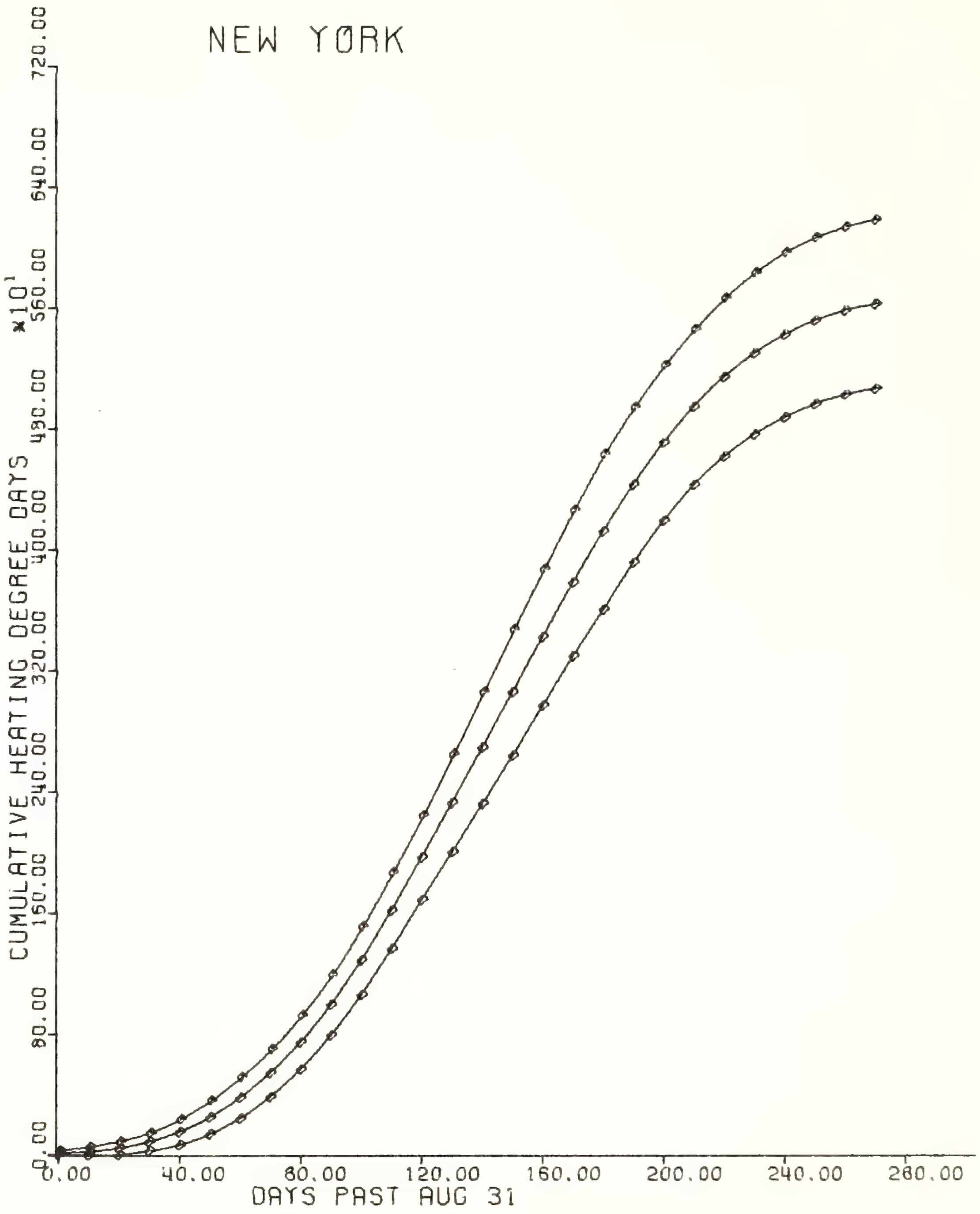
NEW YØRK



NEW YORK
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	25	55	18
20	3	47	91	27
30	27	86	145	36
40	65	149	233	51
50	132	242	352	67
60	232	368	504	83
70	371	529	687	96
80	549	728	907	109
90	771	971	1171	122
100	1035	1260	1485	137
110	1335	1587	1839	153
120	1659	1937	2215	169
130	1976	2296	2616	195
140	2293	2660	3027	224
150	2612	3025	3438	252
160	2941	3391	3841	274
170	3268	3750	4232	294
180	3578	4092	4606	313
190	3889	4406	4923	315
200	4171	4688	5205	315
210	4414	4931	5448	315
220	4606	5132	5658	320
230	4756	5292	5828	327
240	4871	5418	5965	334
250	4963	5515	6067	337
260	5029	5585	6141	339
270	5071	5630	6189	341
273	5079	5639	6199	342

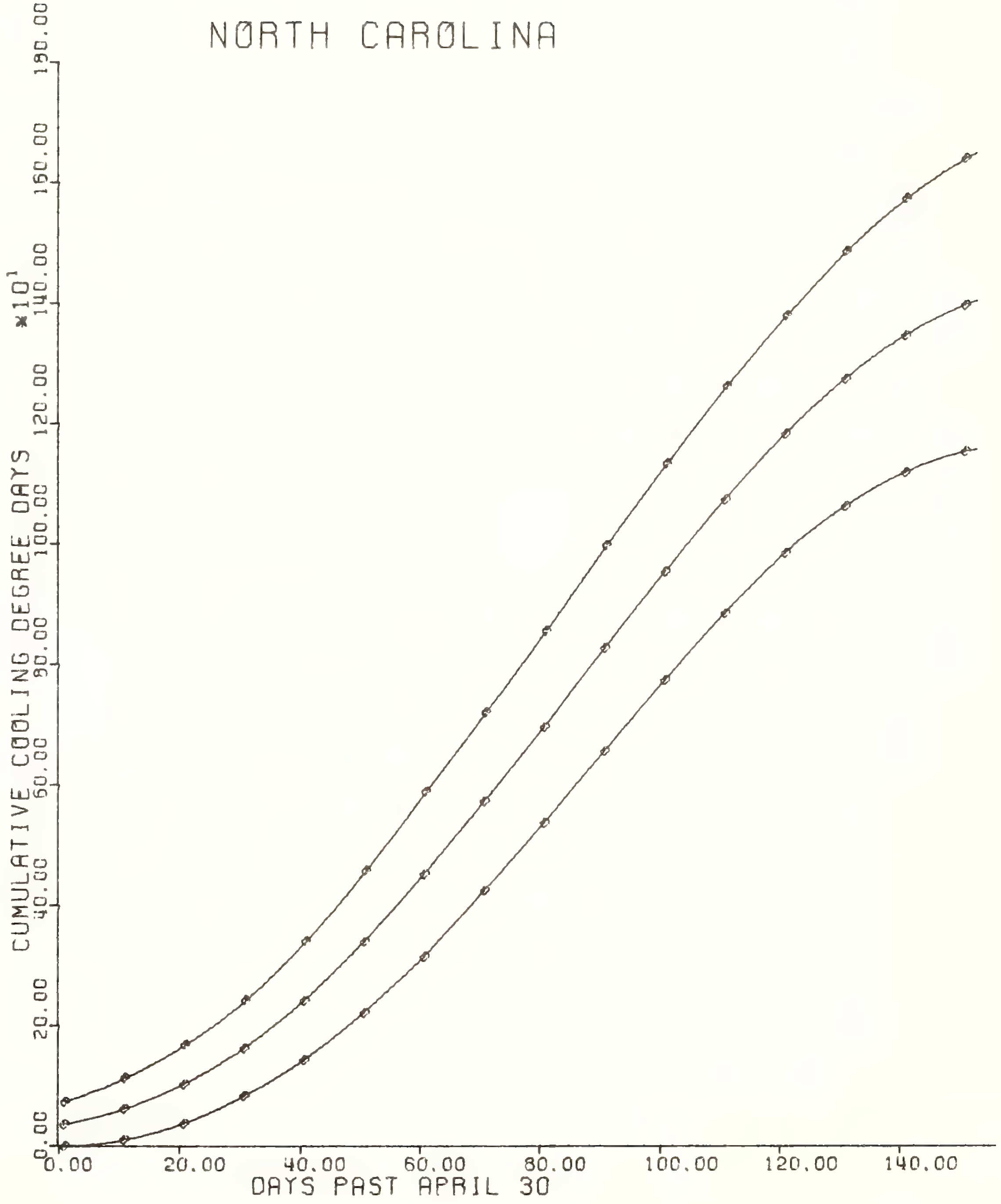
STATION	WEIGHT
BURLINGTON, VT	.0223
ALBANY	.0672
BINGHAMTON	.0654
BUFFALO	.0820
NEW YORK CITY	.6345
ROCHESTER	.0602
SYRACUSE	.0684


NEW YØRK

NORTH CAROLINA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	8	58	108	31
20	34	98	162	39
30	77	155	233	48
40	136	233	330	59
50	214	330	446	71
60	305	440	575	82
70	414	561	708	90
80	526	665	844	97
90	645	815	985	104
100	763	942	1121	109
110	876	1064	1252	115
120	977	1174	1371	120
130	1058	1268	1478	128
140	1116	1342	1568	138
150	1153	1395	1637	147
153	1159	1406	1653	150

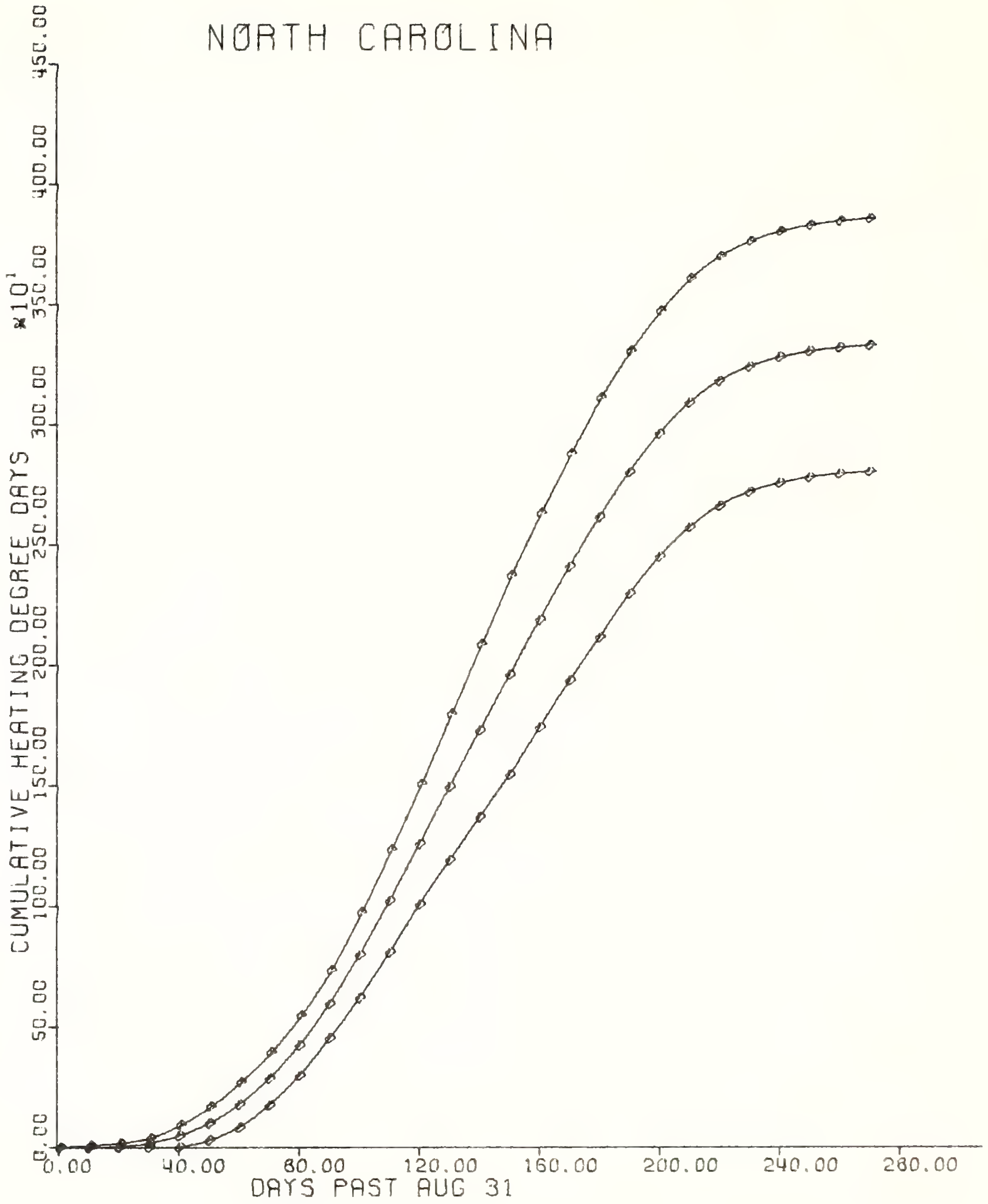
STATION	WEIGHT
ASHEVILLE	.1497
CAPE HATTERAS	.1679
CHARLOTTE	.1775
GREENSBORO	.2044
RALEIGH	.1480
WILMINGTON	.1525



NORTH CAROLINA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	1	6	4
20	0	4	17	8
30	0	16	36	12
40	1	45	89	27
50	27	95	163	42
60	77	169	261	56
70	165	274	383	66
80	265	409	533	76
90	436	578	718	85
100	604	778	952	106
110	791	1002	1213	128
120	991	1238	1485	151
130	1176	1474	1772	182
140	1354	1707	2060	215
150	1531	1939	2347	249
160	1725	2168	2611	270
170	1920	2389	2858	286
180	2101	2597	3093	302
190	2283	2787	3291	307
200	2439	2950	3461	312
210	2565	3082	3599	316
220	2657	3177	3697	317
230	2719	3240	3761	318
240	2757	3280	3803	319
250	2782	3306	3830	319
260	2798	3323	3848	320
270	2807	3333	3859	321
273	2808	3335	3862	321

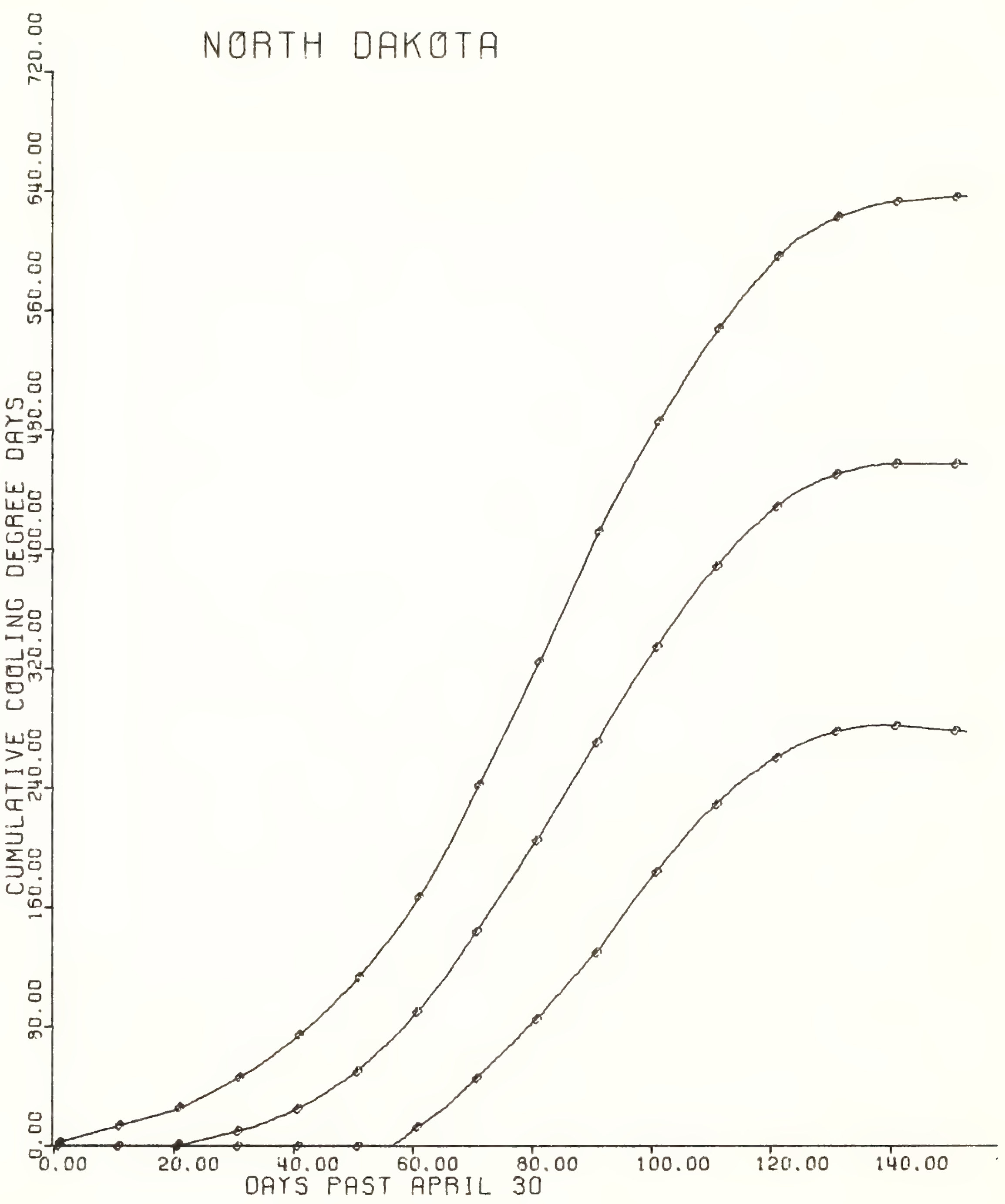
STATION	WEIGHT
ASHEVILLE	.1497
CAPE HATTERAS	.1679
CHARLOTTE	.1775
GREENSBORO	.2044
RALEIGH	.1480
WILMINGTON	.1525



NORTH DAKOTA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	13	8
20	0	0	24	15
30	0	9	44	21
40	0	23	71	30
50	0	47	109	38
60	9	85	161	46
70	42	138	234	59
80	81	199	317	72
90	126	265	404	85
100	179	329	479	92
110	225	384	543	97
120	259	426	593	102
130	277	449	621	105
140	282	458	634	107
150	279	458	637	109
153	278	458	638	110

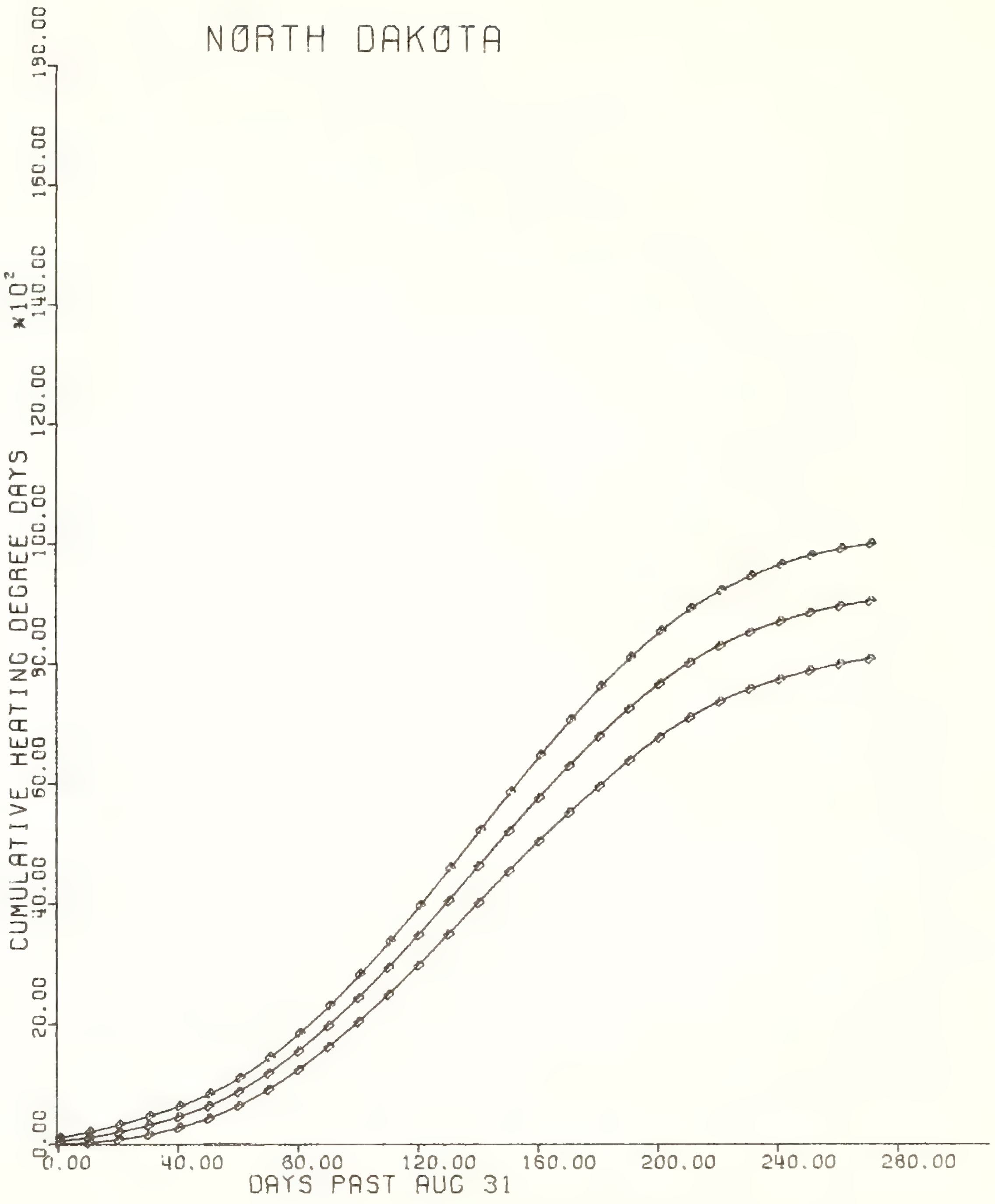
STATION	WEIGHT
BISMARCK	.2023
FARGO	.4547
WILLISTON	.3430



NORTH DAKOTA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	17	107	197	55
20	67	191	315	76
30	145	303	461	96
40	258	441	624	112
50	408	617	826	127
60	615	849	1083	143
70	877	1148	1419	165
80	1202	1510	1818	188
90	1580	1926	2272	211
100	1992	2389	2786	242
110	2443	2892	3341	274
120	2928	3430	3932	306
130	3443	3998	4553	338
140	3973	4582	5191	371
150	4500	5162	5824	404
160	5005	5723	6441	438
170	5481	6256	7031	473
180	5924	6756	7588	506
190	6357	7218	8079	525
200	6747	7634	8521	541
210	7080	7993	8906	557
220	7355	8286	9217	568
230	7570	8518	9466	578
240	7737	8701	9665	588
250	7881	8849	9817	590
260	7996	8964	9932	590
270	8082	9050	10018	590
273	8104	9072	10040	591

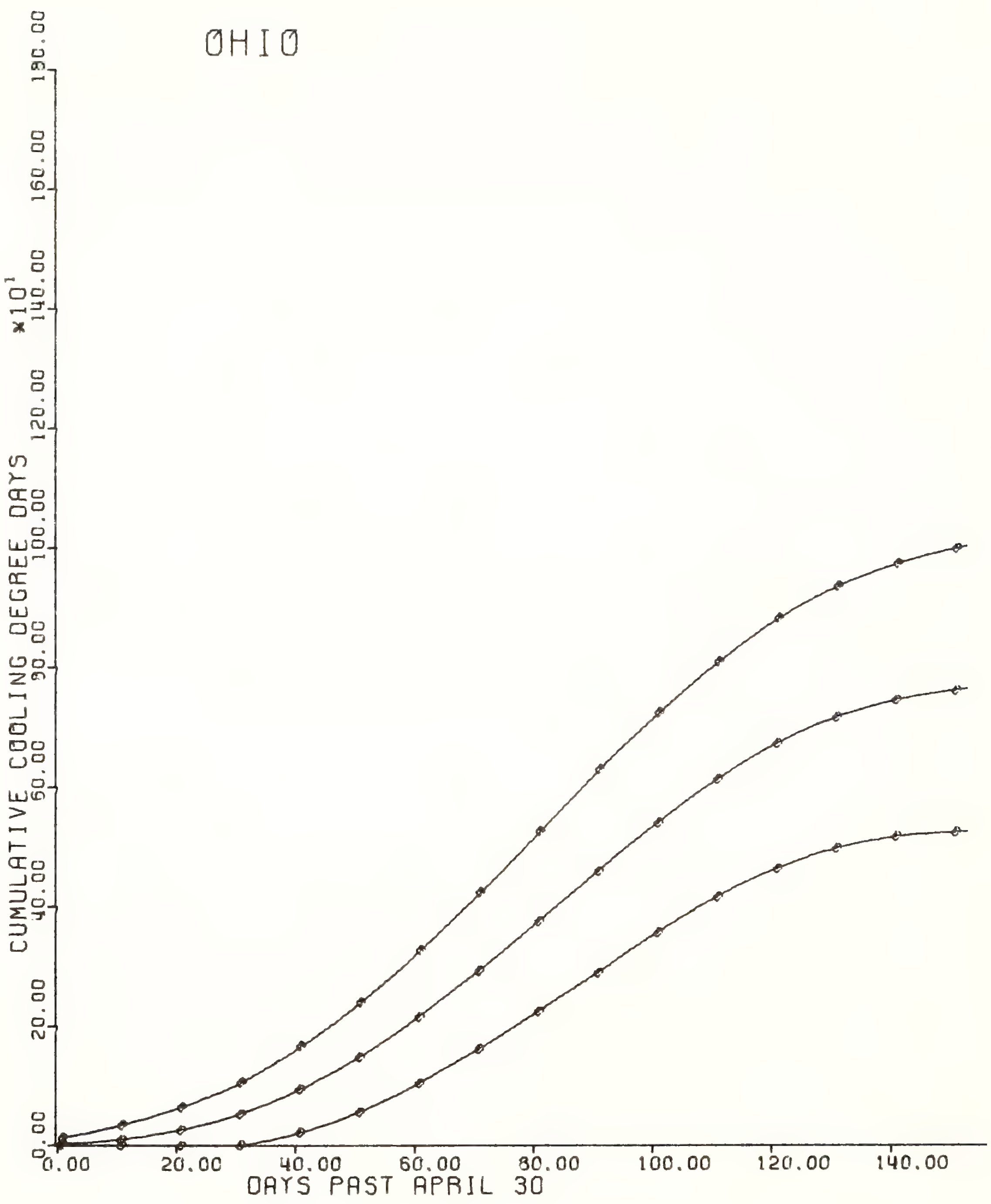
STATION	WEIGHT
BISMARCK	.2023
FARGO	.4547
WILLISTON	.3430



OHIO
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	9	32	14
20	0	24	61	23
30	0	49	100	31
40	19	89	159	43
50	52	142	232	55
60	99	209	319	67
70	156	285	414	79
80	218	367	516	91
90	284	452	620	103
100	351	534	717	111
110	412	607	802	119
120	461	669	877	127
130	496	714	932	133
140	517	744	971	139
150	525	762	999	144
153	527	766	1005	146

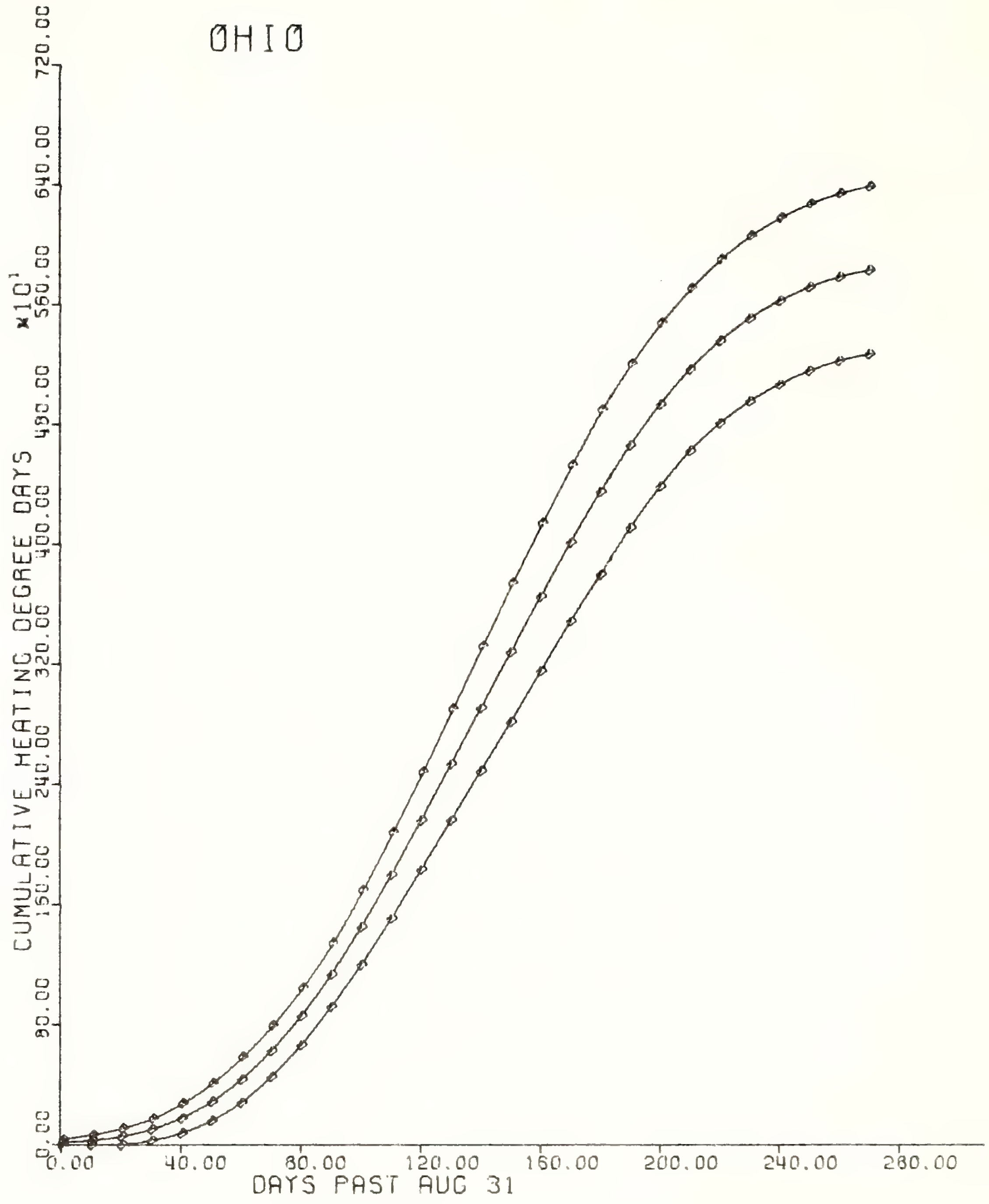
STATION	WEIGHT
PARKERSBURG, WV	.0379
AKRON	.1272
CLEVELAND	.2397
COLUMBUS	.1184
CINCINNATI	.1618
DAYTON	.1188
TOLEDO	.1474
YOUNGSTOWN	.0488



OHIO
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	29	65	22
20	0	53	106	32
30	27	98	169	43
40	73	170	267	59
50	151	275	399	76
60	268	418	568	92
70	434	605	776	104
80	643	834	1025	117
90	895	1106	1317	129
100	1171	1419	1667	151
110	1478	1764	2050	174
120	1804	2127	2450	197
130	2131	2499	2867	224
140	2460	2874	3288	252
150	2787	3247	3707	280
160	3124	3617	4110	301
170	3457	3979	4501	318
180	3772	4322	4872	335
190	4085	4636	5187	336
200	4366	4914	5462	334
210	4606	5152	5698	333
220	4798	5347	5896	335
230	4948	5501	6054	337
240	5065	5622	6179	340
250	5157	5716	6275	341
260	5227	5786	6345	341
270	5274	5834	6394	341
273	5284	5844	6404	341

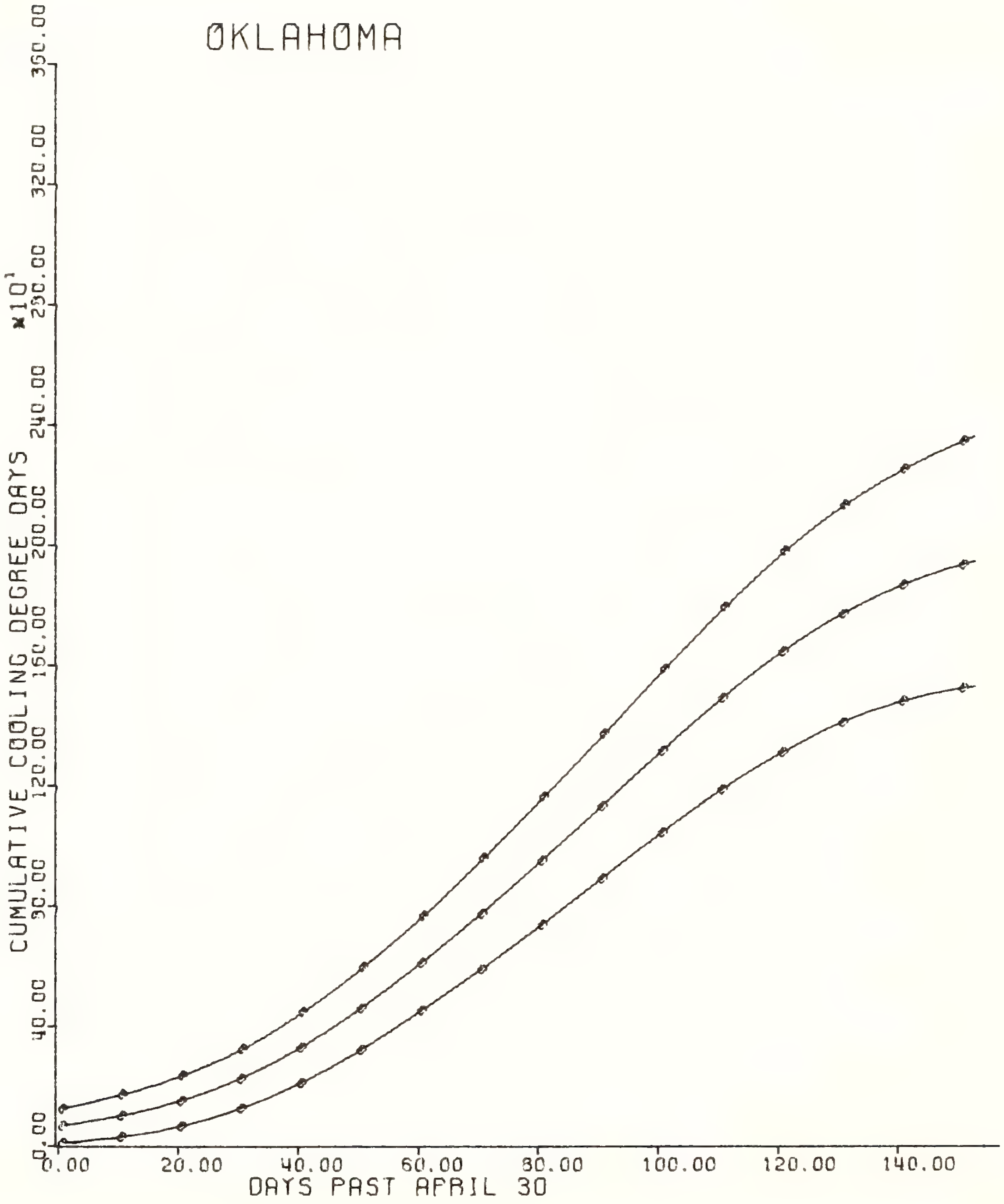
STATION	WEIGHT
PARKERSBURG, WV	.0379
AKRON	.1272
CLEVELAND	.2397
COLUMBUS	.1184
CINCINNATI	.1618
DAYTON	.1188
TOLEDO	.1474
YOUNGSTOWN	.0488



OKLAHOMA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	28	98	168	42
20	62	146	230	51
30	120	218	316	60
40	202	319	436	71
50	310	446	582	83
60	439	595	751	95
70	575	758	941	112
80	722	933	1144	129
90	875	1114	1353	146
100	1029	1299	1569	164
110	1175	1476	1777	183
120	1302	1634	1966	203
130	1404	1763	2122	219
140	1478	1862	2246	234
150	1524	1933	2342	249
153	1532	1949	2366	254

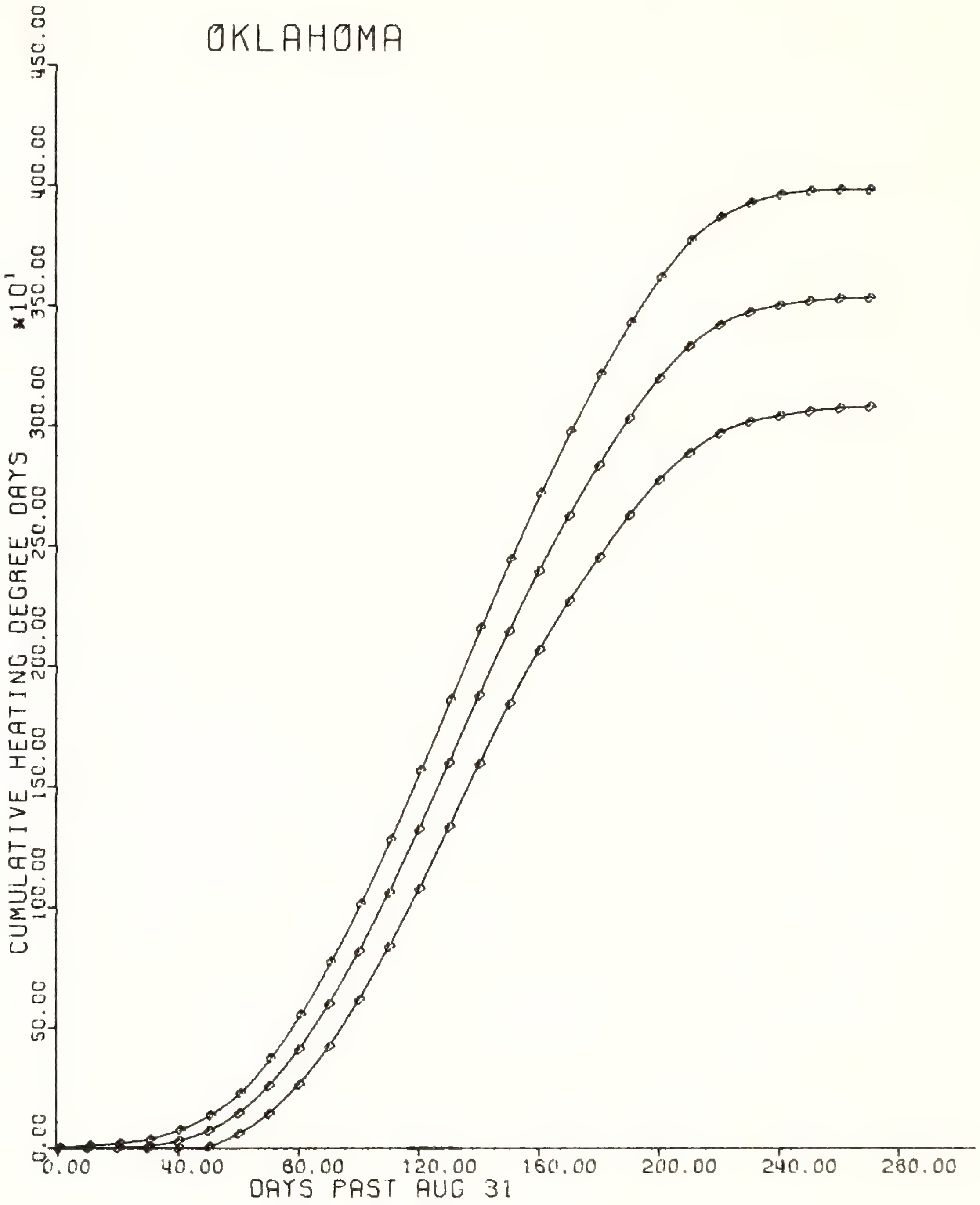
STATION	WEIGHT
FOPT SMITH, AR	.1262
DODGE CITY, KS	.0145
WICHITA FALLS, TX	.1641
OKLAHOMA CITY	.3845
TULSA	.3107



OKLAHOMA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	10	6
20	0	1	19	11
30	0	8	34	16
40	0	27	72	27
50	2	66	130	39
60	52	136	220	51
70	132	245	358	69
80	250	394	538	88
90	404	578	752	106
100	596	794	992	121
110	815	1036	1257	135
120	1053	1297	1541	149
130	1308	1571	1834	161
140	1569	1850	2131	172
150	1820	2119	2418	183
160	2047	2371	2695	198
170	2251	2603	2955	215
180	2436	2816	3196	231
190	2611	3012	3413	244
200	2762	3183	3604	257
210	2878	3320	3762	269
220	2963	3413	3863	274
230	3015	3470	3925	277
240	3042	3502	3962	281
250	3061	3520	3979	280
260	3075	3530	3985	278
270	3082	3534	3986	276
273	3083	3534	3985	275

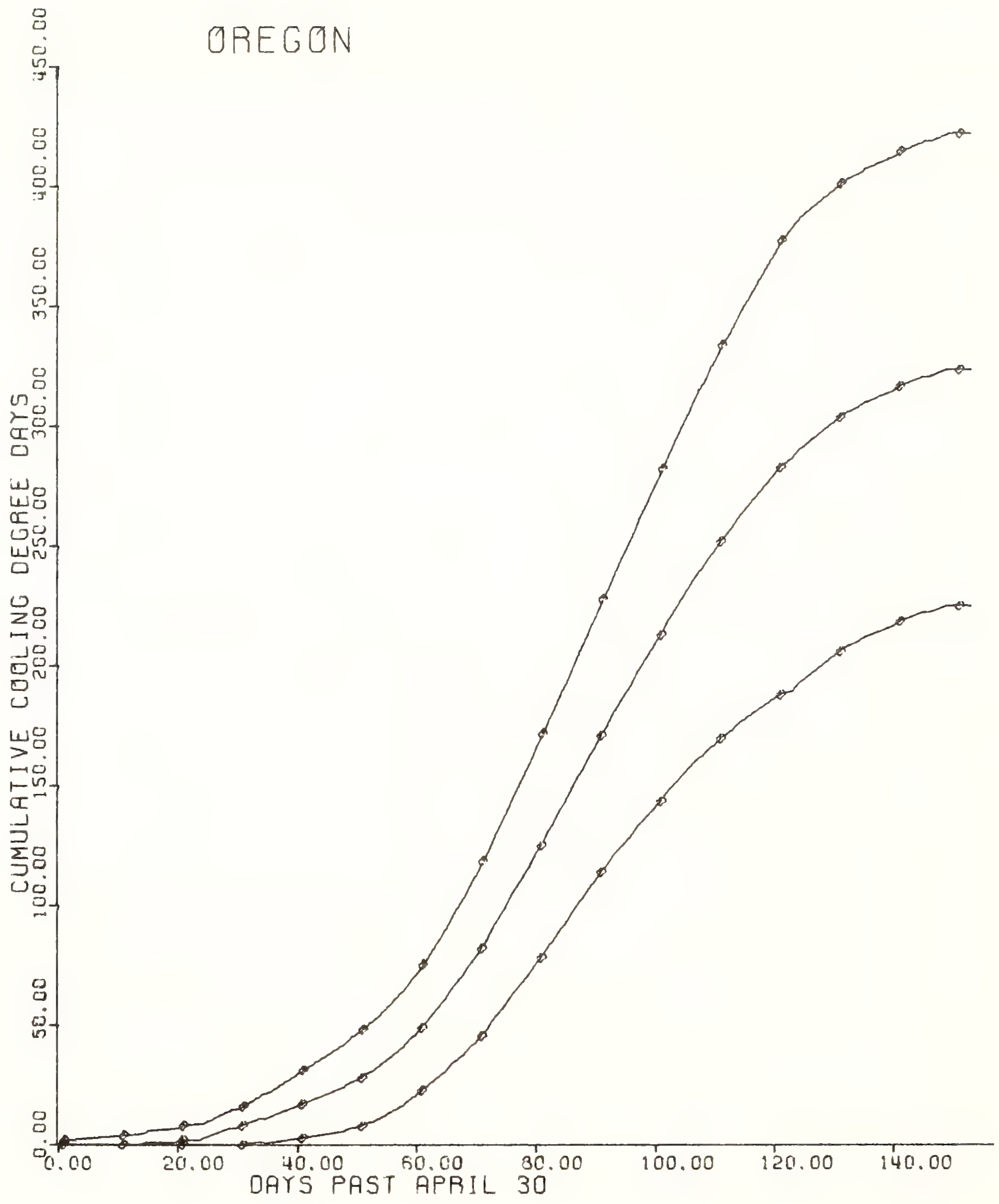
STATION	WEIGHT
FORT SMITH, AR	.1262
DODGE CITY, KS	.0145
WICHITA FALLS, TX	.1641
OKLAHOMA CITY	.3845
TULSA	.3107



OREGON
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	4	2
20	0	1	7	4
30	0	7	15	5
40	2	16	30	8
50	7	27	47	12
60	20	46	72	16
70	43	78	113	22
80	75	121	167	28
90	110	166	222	34
100	141	209	277	42
110	167	248	329	49
120	187	280	373	57
130	204	302	400	60
140	217	315	413	60
150	225	324	423	60
153	225	324	423	60

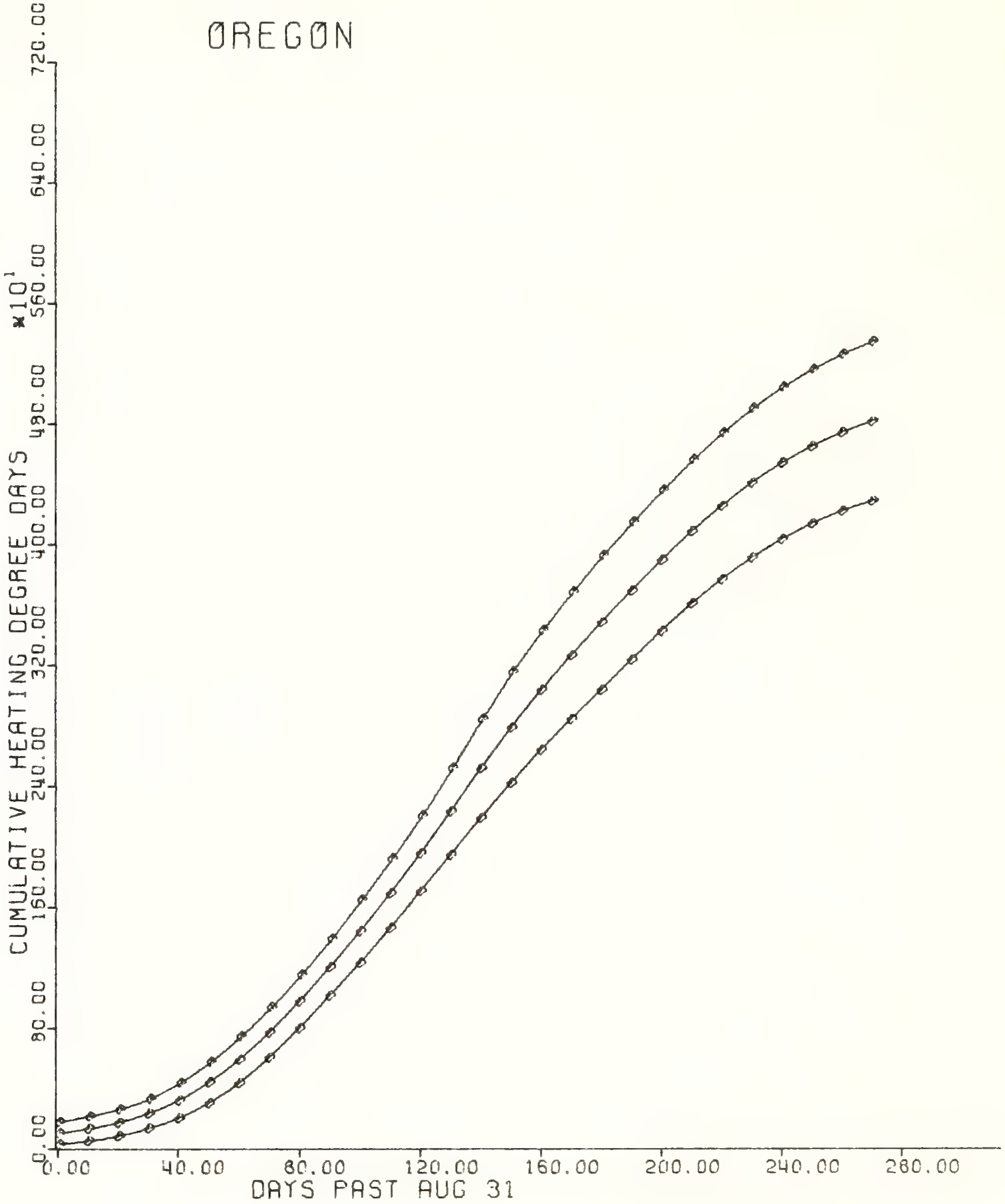
STATION	WEIGHT
BOISE, ID	.0110
ASTORIA	.0880
BURNS	.0301
MEDFORD	.1191
PENDLETON	.0636
PORTLAND	.5371
SALEM	.1511



OREGON
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	53	134	215	49
20	83	172	261	54
30	134	231	328	59
40	199	315	431	71
50	295	430	565	82
60	423	577	731	94
70	589	755	921	101
80	783	960	1137	108
90	995	1184	1373	115
100	1213	1421	1629	127
110	1441	1670	1899	139
120	1686	1935	2184	152
130	1926	2211	2496	174
140	2170	2495	2820	198
150	2402	2767	3132	223
160	2623	3018	3413	241
170	2829	3249	3669	256
180	3021	3467	3913	272
190	3222	3680	4138	279
200	3415	3883	4351	286
210	3595	4074	4553	292
220	3760	4248	4736	298
230	3905	4402	4899	303
240	4030	4536	5042	309
250	4134	4649	5164	314
260	4220	4743	5266	319
270	4290	4821	5352	324
273	4307	4840	5373	325

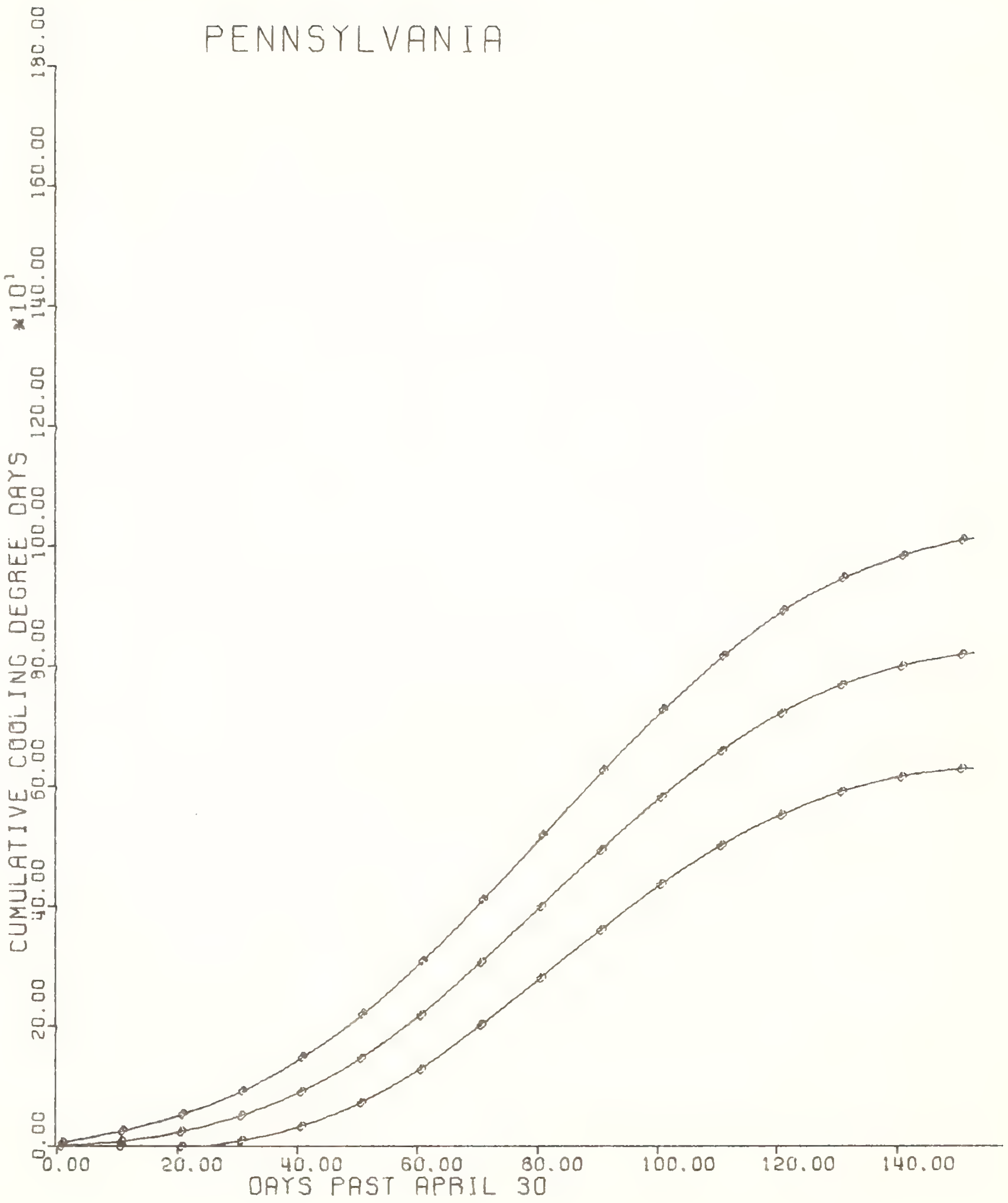
STATION	WEIGHT
BOISE, ID	.0110
ASTORIA	.0880
BURNS	.0301
MEDFORD	.1191
PENDLETON	.0636
PORTLAND	.5371
SALEM	.1511



PENNSYLVANIA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	7	23	10
20	0	22	50	17
30	8	48	88	25
40	30	86	142	34
50	68	140	212	44
60	123	212	301	54
70	195	298	401	63
80	273	390	507	72
90	353	485	617	80
100	430	574	718	88
110	496	653	810	96
120	549	718	887	103
130	589	766	943	108
140	615	799	983	112
150	629	819	1009	116
153	631	823	1015	117

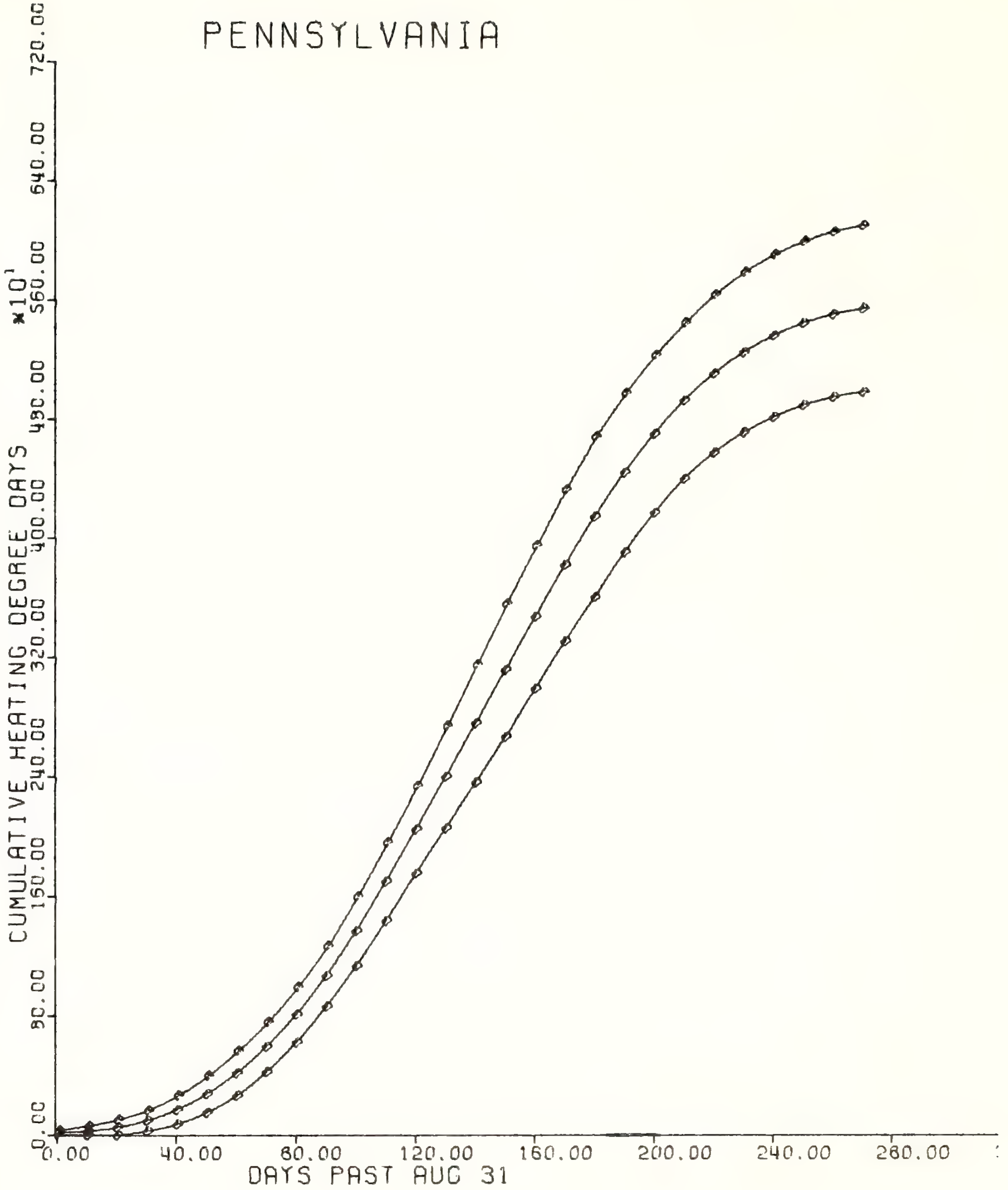
STATION	WEIGHT
ALLENTOWN	.0577
ERIE	.0626
HARRISBURG	.0689
PHILADELPHIA	.3799
PITTSBURGH	.3162
WILKESBARRE SCRANTON	.1147



PENNSYLVANIA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	27	60	20
20	0	50	101	31
30	26	94	162	41
40	69	164	259	58
50	143	265	387	74
60	252	401	550	91
70	407	574	741	102
80	603	787	971	112
90	840	1041	1242	123
100	1108	1338	1568	140
110	1407	1667	1927	159
120	1724	2015	2306	177
130	2031	2369	2707	206
140	2336	2726	3116	238
150	2642	3083	3524	269
160	2961	3439	3917	291
170	3281	3788	4295	309
180	3580	4117	4654	327
190	3881	4417	4953	327
200	4151	4682	5213	324
210	4383	4909	5435	321
220	4564	5095	5626	324
230	4703	5242	5761	328
240	4810	5356	5902	333
250	4893	5443	5993	336
260	4951	5506	6061	338
270	4987	5546	6105	341
273	4993	5553	6113	341

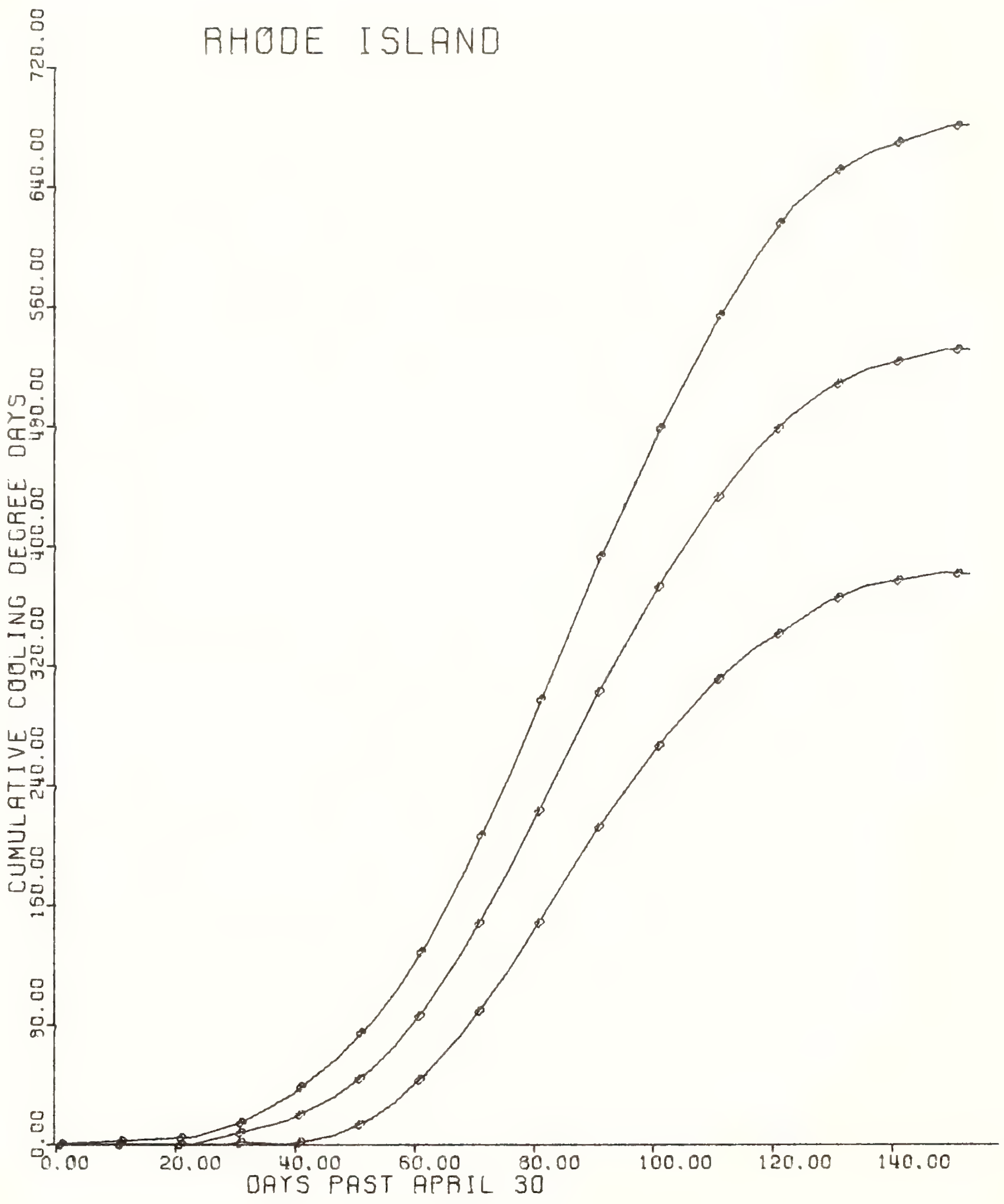
STATION	WEIGHT
ALLENTOWN	.0577
ERIE	.0626
HARRISBURG	.0689
PHILADELPHIA	.3799
PITTSBURGH	.3162
WILKESBARRE SCRANTON	.1147



RHODE ISLAND
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	2	1
20	0	0	4	3
30	1	7	13	4
40	1	18	35	11
50	11	41	71	18
60	39	81	123	25
70	84	141	198	35
80	142	215	288	45
90	206	295	384	54
100	261	366	471	64
110	308	428	548	73
120	339	475	611	83
130	364	507	650	87
140	377	523	669	89
150	383	532	681	91
153	382	532	682	92

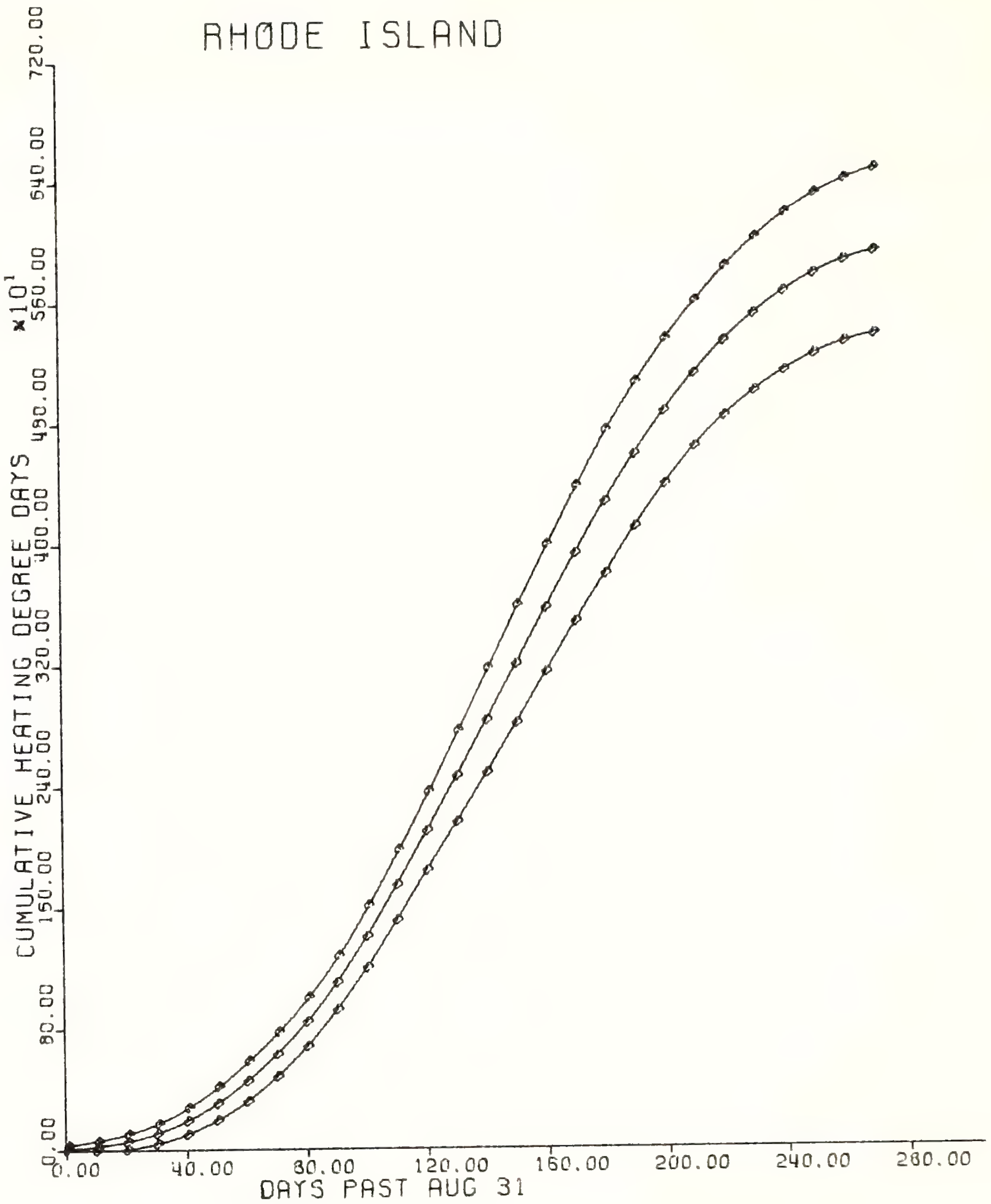
STATION	WEIGHT
PROVIDENCE	1.0000



RHODE ISLAND
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	24	61	23
20	2	53	104	31
30	38	103	168	40
40	94	182	270	54
50	184	294	404	67
60	304	437	570	81
70	463	612	761	91
80	658	822	986	100
90	897	1076	1255	109
100	1172	1377	1582	125
110	1482	1714	1946	141
120	1812	2071	2330	158
130	2132	2431	2730	182
140	2454	2797	3140	209
150	2781	3167	3553	236
160	3118	3537	3956	256
170	3450	3898	4346	273
180	3766	4242	4718	291
190	4079	4560	5041	294
200	4363	4847	5331	295
210	4614	5100	5586	296
220	4821	5318	5815	303
230	4989	5500	6011	311
240	5127	5651	6175	320
250	5238	5771	6304	325
260	5321	5862	6403	330
270	5374	5923	6472	335
273	5384	5936	6488	336

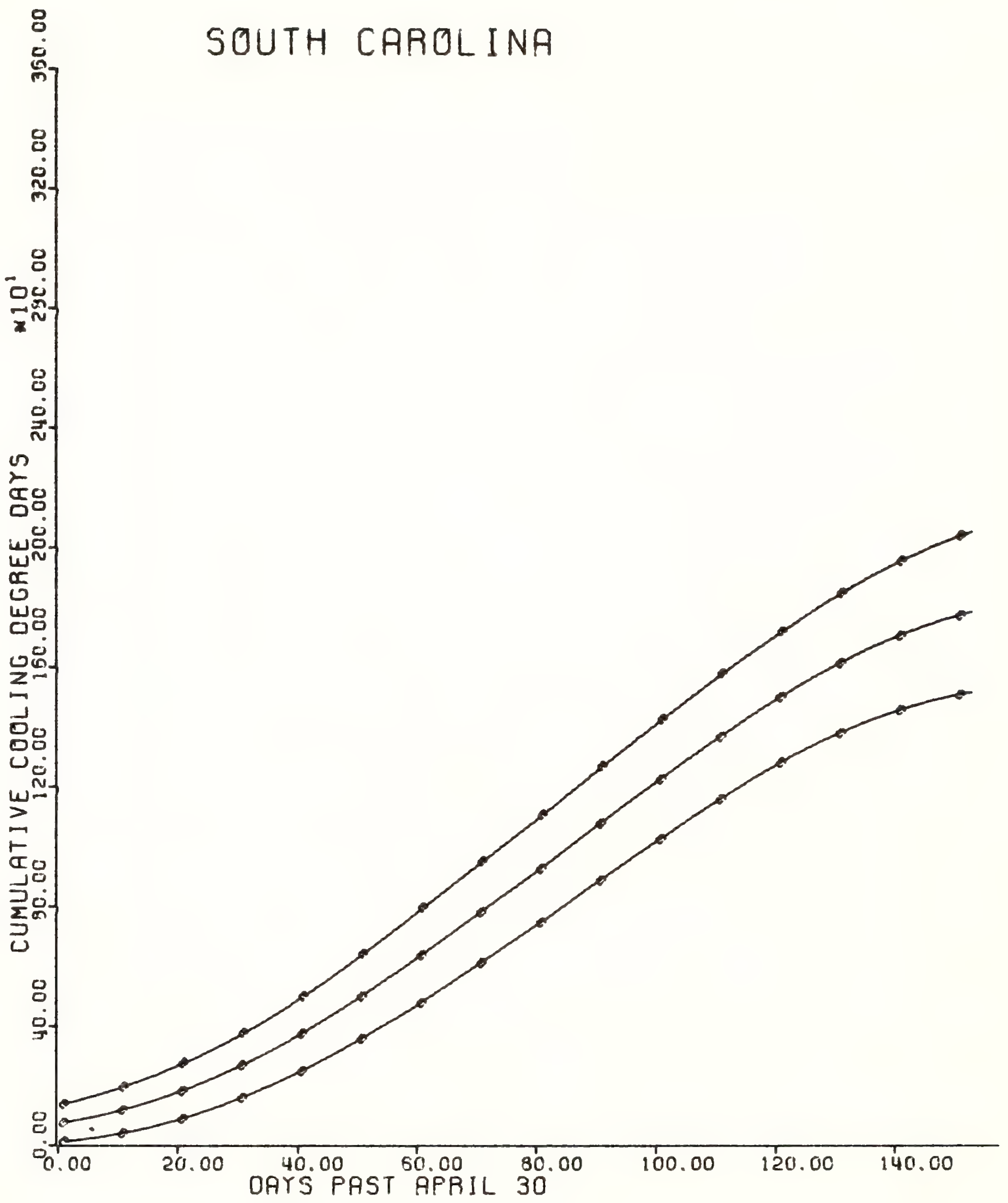
STATION	WEIGHT
PROVIDENCE	1.0000



SOUTH CAROLINA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	38	115	192	47
20	85	177	269	56
30	153	260	367	65
40	241	365	489	75
50	348	488	628	86
60	467	624	781	96
70	601	769	937	103
80	735	914	1093	109
90	877	1066	1255	115
100	1015	1214	1413	121
110	1149	1358	1567	127
120	1273	1491	1709	133
130	1375	1607	1839	142
140	1454	1702	1950	151
150	1509	1773	2037	161
153	1520	1789	2058	164

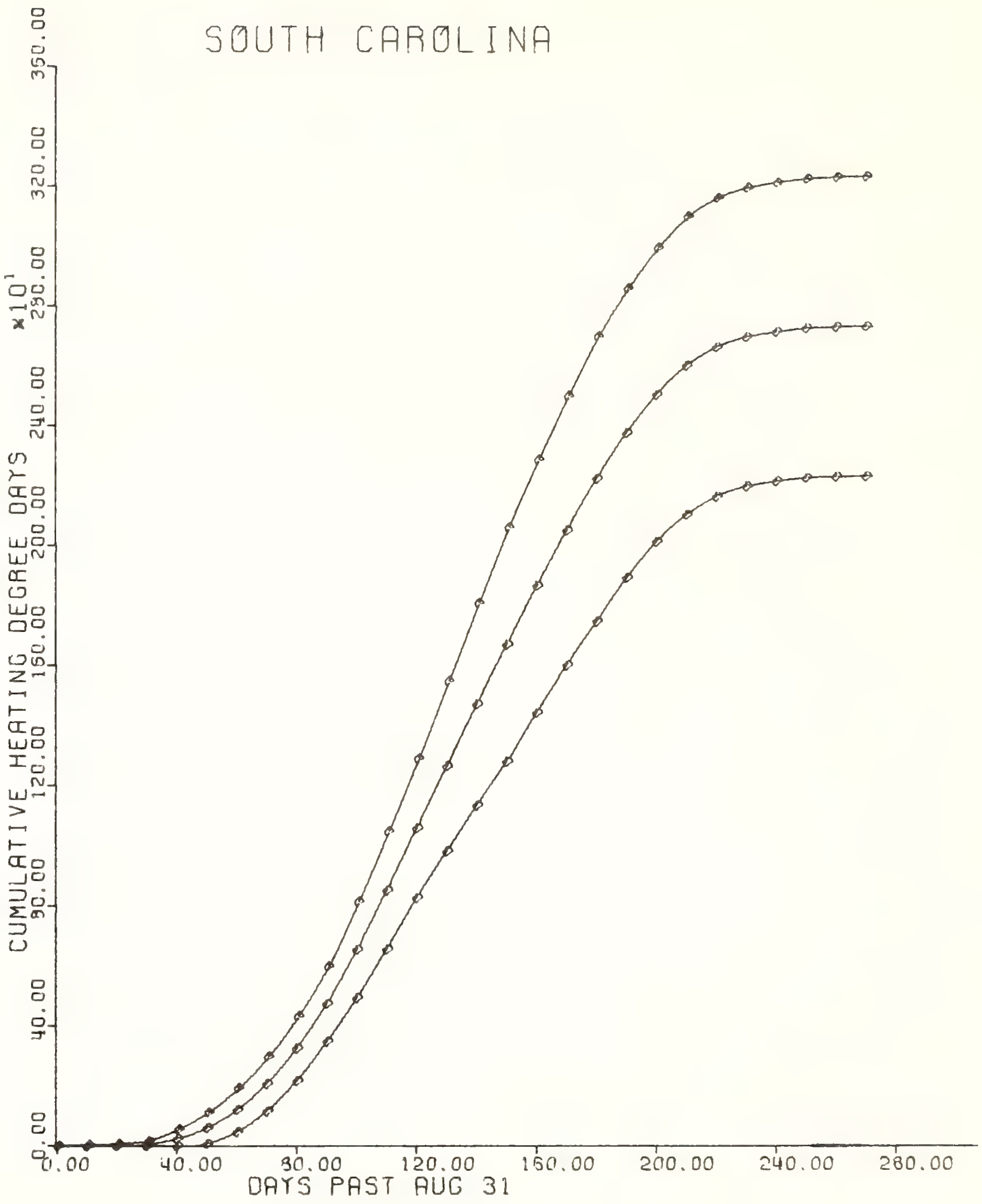
STATION	WEIGHT
CHARLOTTE, NC	.1262
WILMINGTON, NC	.1108
CHARLESTON	.1872
COLUMBIA	.2917
GREENVILLE-SPRTNBG.	.2841



SOUTH CAROLINA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	3	2
20	0	0	6	4
30	0	4	13	6
40	0	21	51	18
50	5	55	105	31
60	41	112	183	43
70	108	197	286	54
80	206	312	418	65
90	335	458	581	75
100	477	634	791	96
110	639	832	1025	117
120	810	1038	1266	139
130	967	1245	1523	169
140	1119	1450	1781	202
150	1267	1651	2035	234
160	1427	1846	2265	256
170	1587	2033	2479	272
180	1733	2206	2679	289
190	1880	2362	2844	294
200	2002	2492	2982	299
210	2096	2593	3090	303
220	2160	2659	3158	304
230	2196	2695	3194	304
240	2214	2713	3212	304
250	2227	2726	3225	304
260	2231	2731	3231	305
270	2233	2734	3235	305
273	2233	2734	3235	305

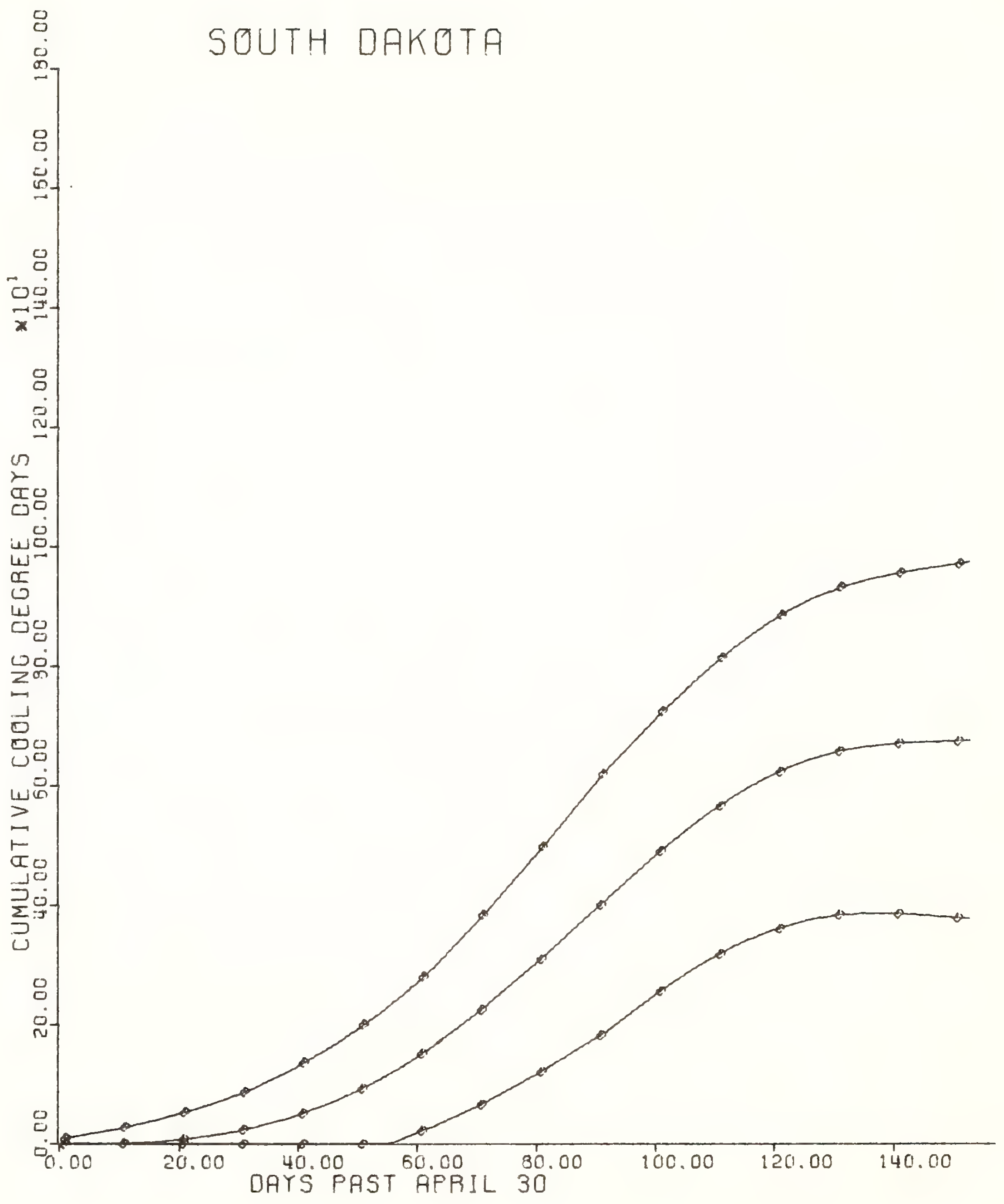
STATION	WEIGHT
CHARLOTTE, NC	.1262
WILMINGTON, NC	.1108
CHARLESTON	.1872
COLUMBIA	.2917
GREENVILLE-SPRTNBG.	.2841



SOUTH DAKOTA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	26	16
20	0	7	51	27
30	0	21	83	38
40	0	48	131	51
50	0	88	193	64
60	17	144	271	77
70	61	217	373	95
80	115	301	487	114
90	176	392	608	132
100	249	482	715	142
110	313	561	809	151
120	353	620	882	160
130	382	656	930	167
140	386	671	956	174
150	380	676	972	181
153	377	677	977	183

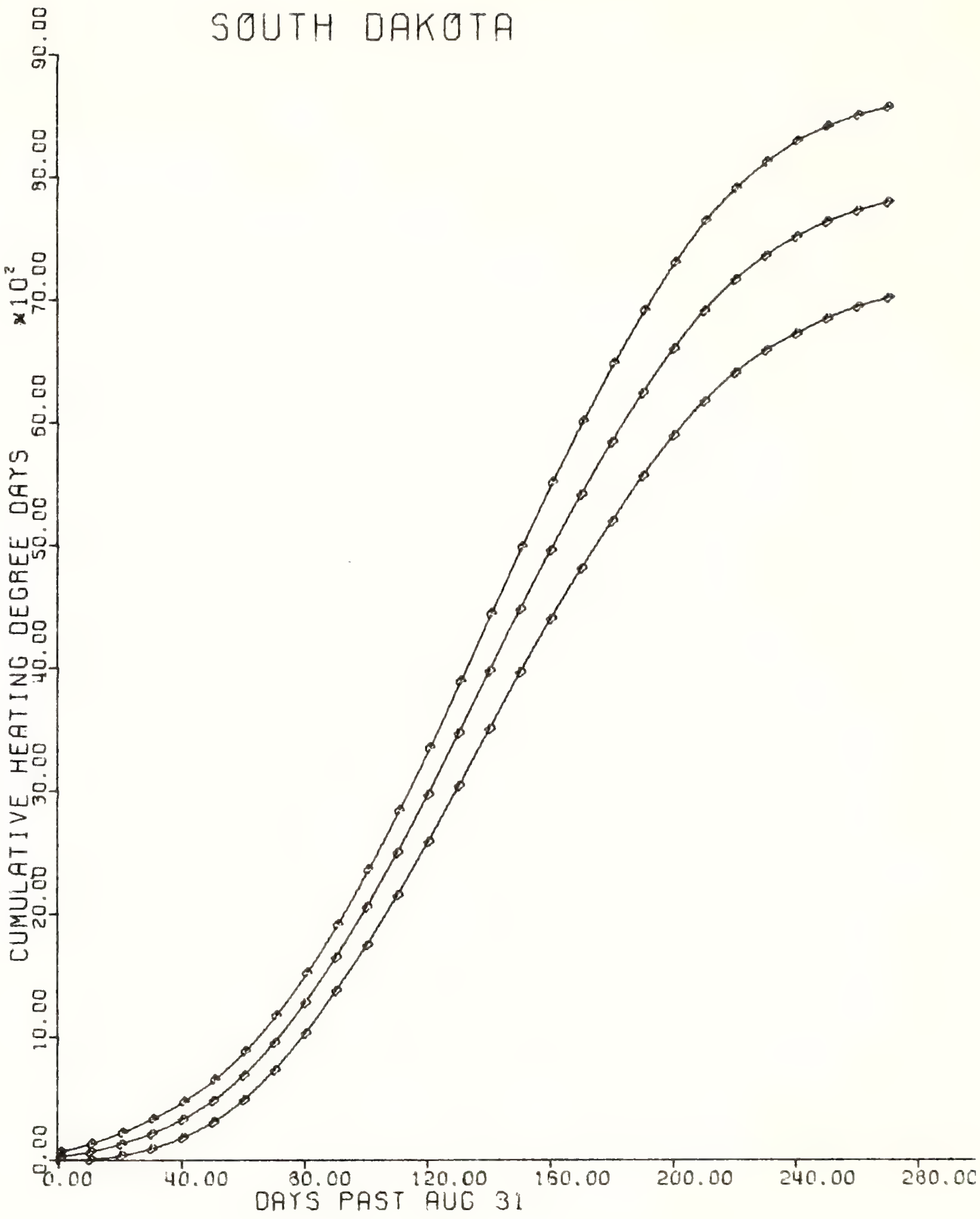
STATION	WEIGHT
VALENTINE, NB	.0360
ABERDEEN	.1727
HURON	.2252
RAPID CITY	.2057
SIOUX FALLS	.3604



SOUTH DAKOTA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	63	128	40
20	28	122	216	57
30	83	205	327	74
40	168	315	462	90
50	290	463	636	105
60	466	664	862	121
70	702	924	1146	135
80	996	1242	1488	150
90	1339	1608	1877	164
100	1707	2013	2319	186
110	2109	2453	2797	210
120	2541	2923	3305	233
130	2994	3418	3842	259
140	3459	3926	4393	285
150	3918	4428	4938	311
160	4358	4912	5466	338
170	4771	5369	5967	365
180	5158	5800	6442	391
190	5529	6203	6877	411
200	5862	6567	7272	430
210	6147	6883	7619	449
220	6385	7140	7895	460
230	6570	7342	8114	470
240	6712	7500	8288	480
250	6836	7625	8414	481
260	6937	7722	8507	479
270	7011	7793	8575	477
273	7029	7810	8591	476

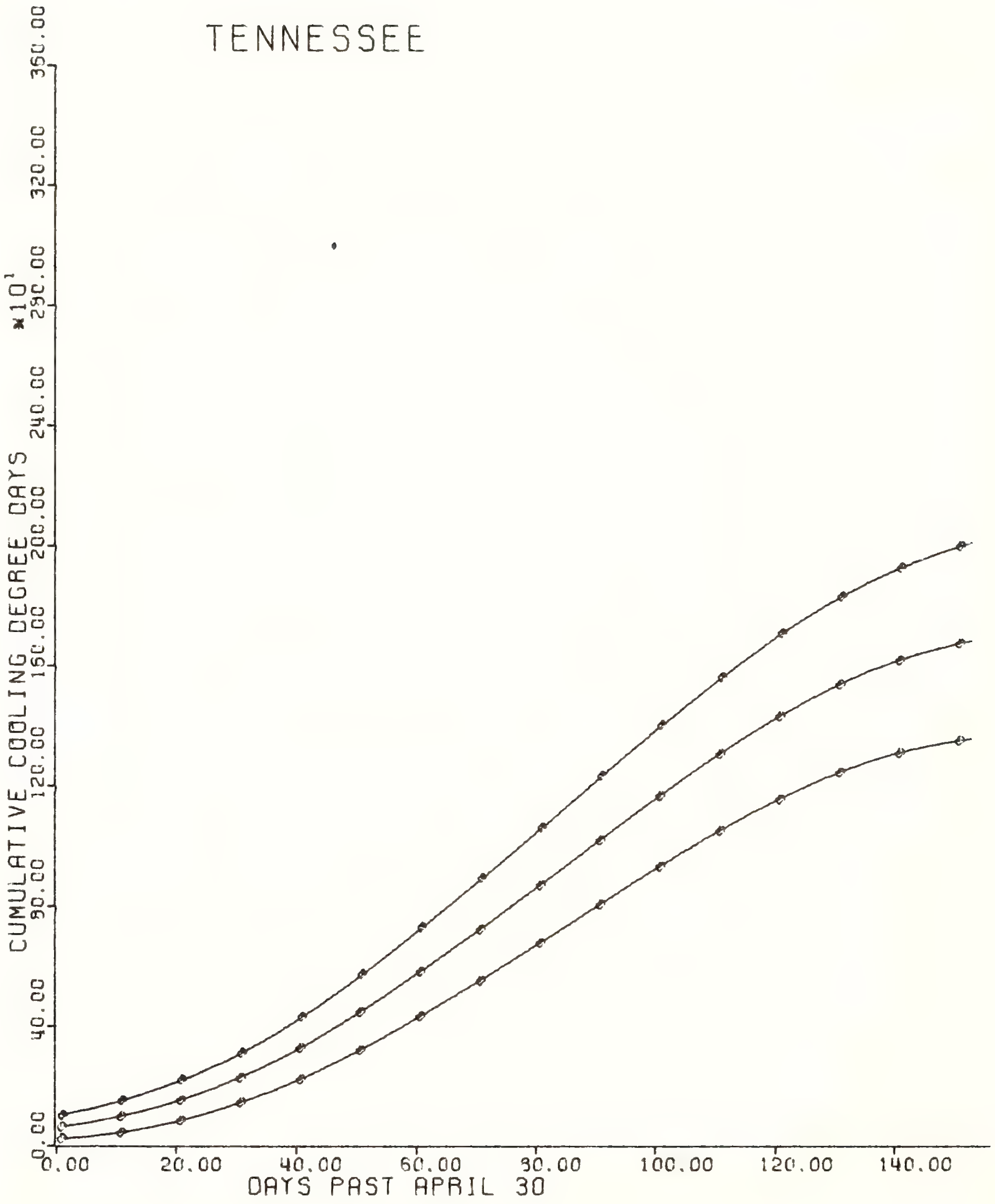
STATION	WEIGHT
VALENTINE, NB	.0360
ABERDEEN	.1727
HURON	.2252
RAPID CITY	.2057
SIOUX FALLS	.3604



TENNESSEE
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	43	95	147	32
20	81	147	213	40
30	140	221	302	49
40	215	317	419	62
50	311	435	559	76
60	423	569	715	89
70	542	710	878	103
80	667	857	1047	116
90	795	1007	1219	129
100	923	1156	1389	142
110	1044	1297	1550	155
120	1151	1425	1699	167
130	1241	1532	1823	178
140	1310	1617	1924	187
150	1353	1675	1997	197
153	1361	1688	2015	199

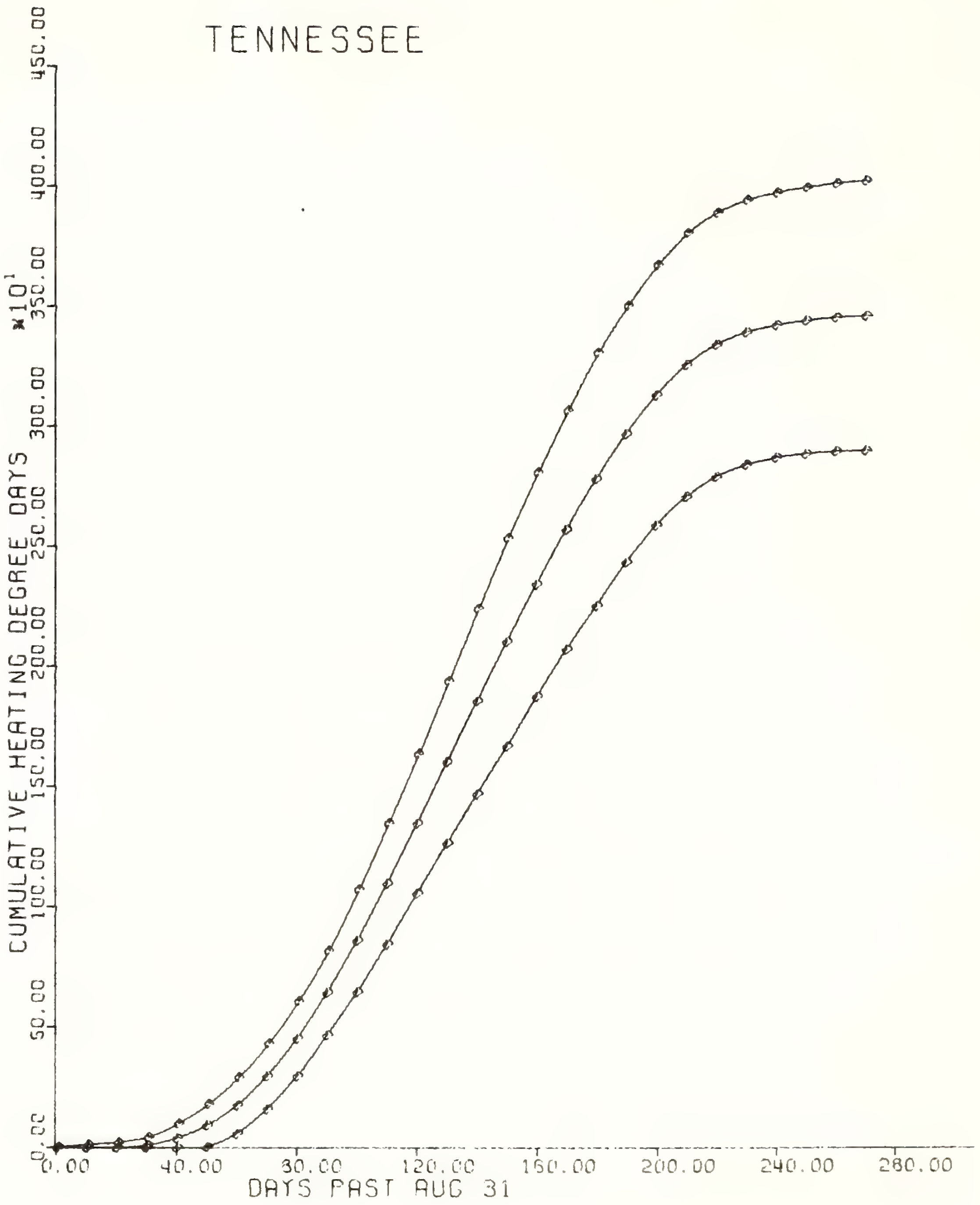
STATION	WEIGHT
CHATTANOOGA	.1058
KNOXVILLE	.3211
MEMPHIS	.2943
NASHVILLE	.2788



TENNESSEE
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	11	7
20	0	0	21	13
30	0	9	39	18
40	0	36	94	35
50	0	86	172	53
60	52	166	280	70
70	149	283	417	82
80	282	436	590	94
90	450	623	796	105
100	628	837	1046	128
110	826	1073	1320	151
120	1035	1321	1607	174
130	1243	1575	1907	203
140	1448	1829	2210	232
150	1648	2077	2506	262
160	1854	2319	2784	283
170	2053	2546	3043	302
180	2235	2760	3285	320
190	2418	2952	3486	326
200	2575	3117	3659	330
210	2698	3247	3796	335
220	2785	3336	3887	336
230	2840	3391	3942	336
240	2871	3423	3975	337
250	2888	3443	3998	338
260	2900	3458	4016	340
270	2904	3466	4028	343
273	2905	3468	4031	343

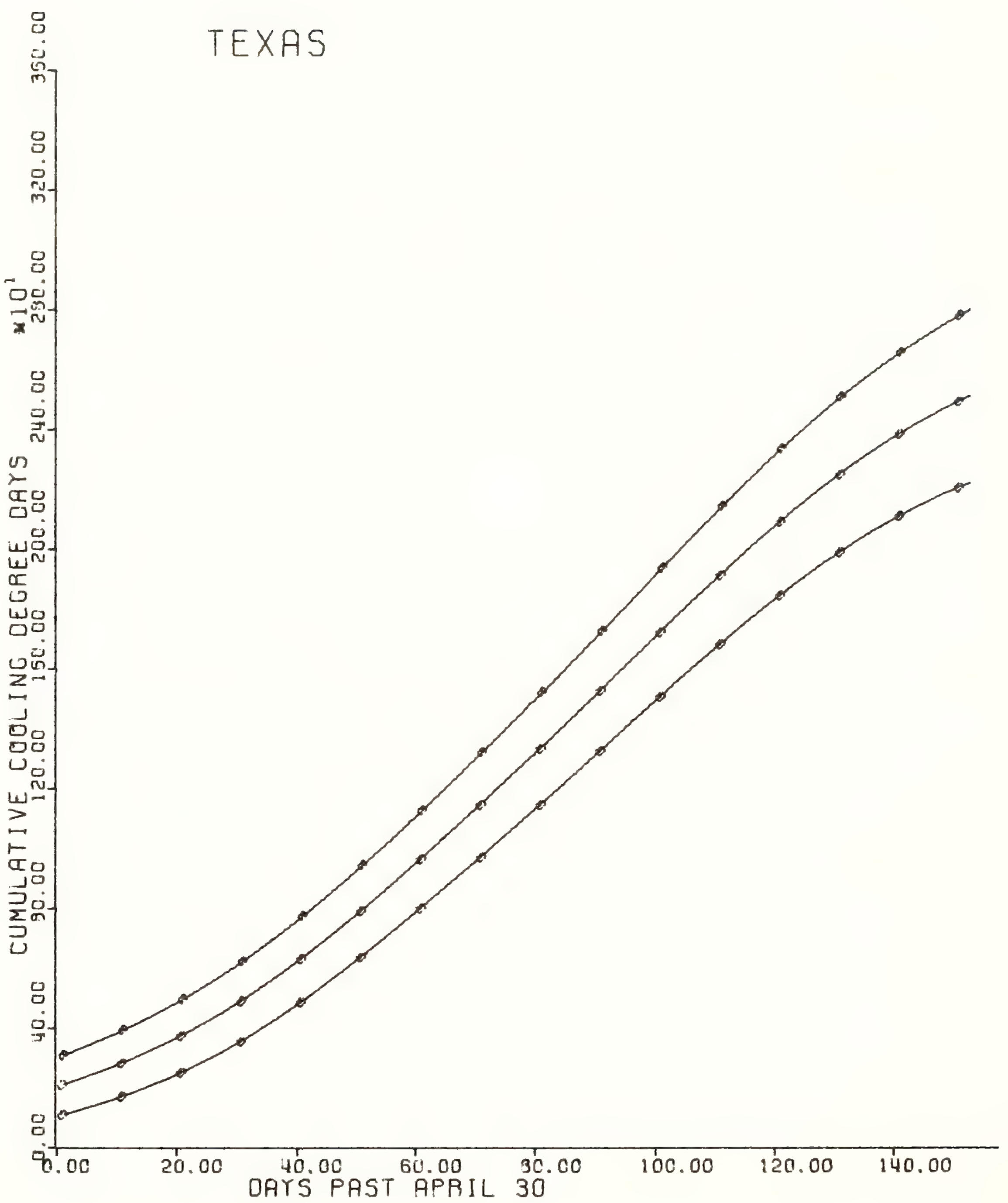
STATION	WEIGHT
CHATTANOOGA	.1058
KNOXVILLE	.3211
MEMPHIS	.2943
NASHVILLE	.2788



TEXAS
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	163	274	385	67
20	242	364	486	74
30	344	478	612	81
40	472	615	758	87
50	621	774	927	93
60	784	947	1110	99
70	954	1129	1304	107
80	1129	1316	1503	114
90	1309	1508	1707	122
100	1491	1705	1919	131
110	1666	1896	2126	140
120	1831	2076	2321	149
130	1978	2237	2496	158
140	2102	2375	2648	166
150	2200	2487	2774	175
153	2225	2516	2807	177

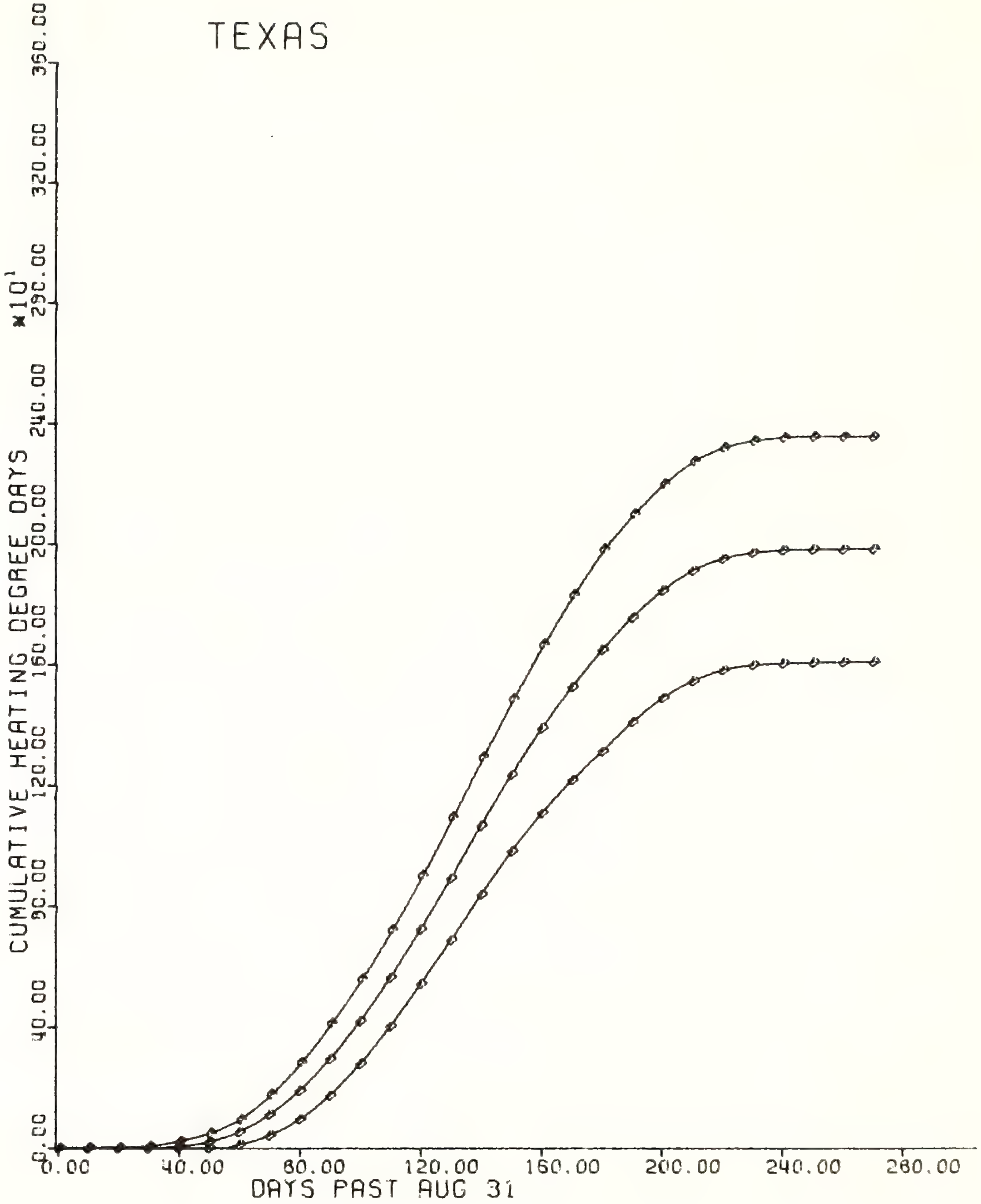
STATION	WEIGHT
SHREVEPORT, LA	.0641
ABILENE	.0236
AMARILLO	.0301
AUSTIN	.0549
BROWNSVILLE	.0301
CORPUS CHRISTI	.0316
DEL RIO	.0044
EL PASO	.0368
FORT WORTH	.2333
GALVESTON	.0284
HOUSTON	.1963
LUBBOCK	.0296
MIDLAND	.0269
PORT ARTHUR-BEAUMONT	.0371
SAN ANGELO	.0085
SAN ANTONIO	.1016
VICTORIA	.0136
WACO	.0259
WICHITA FALLS	.0182



TEXAS
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	2	1
20	0	0	3	2
30	0	1	6	3
40	0	5	22	10
50	0	19	48	18
60	9	50	91	25
70	38	104	170	40
80	69	181	273	56
90	165	283	401	72
100	268	407	546	85
110	390	549	708	97
120	529	708	887	109
130	675	877	1079	123
140	825	1052	1279	138
150	970	1221	1472	153
160	1099	1376	1653	169
170	1210	1515	1820	186
180	1306	1639	1972	203
190	1404	1749	2094	210
200	1485	1840	2195	216
210	1544	1909	2274	222
220	1582	1951	2320	225
230	1601	1973	2345	227
240	1607	1982	2357	229
250	1610	1985	2360	229
260	1611	1986	2361	229
270	1612	1987	2362	228
273	1613	1987	2361	228

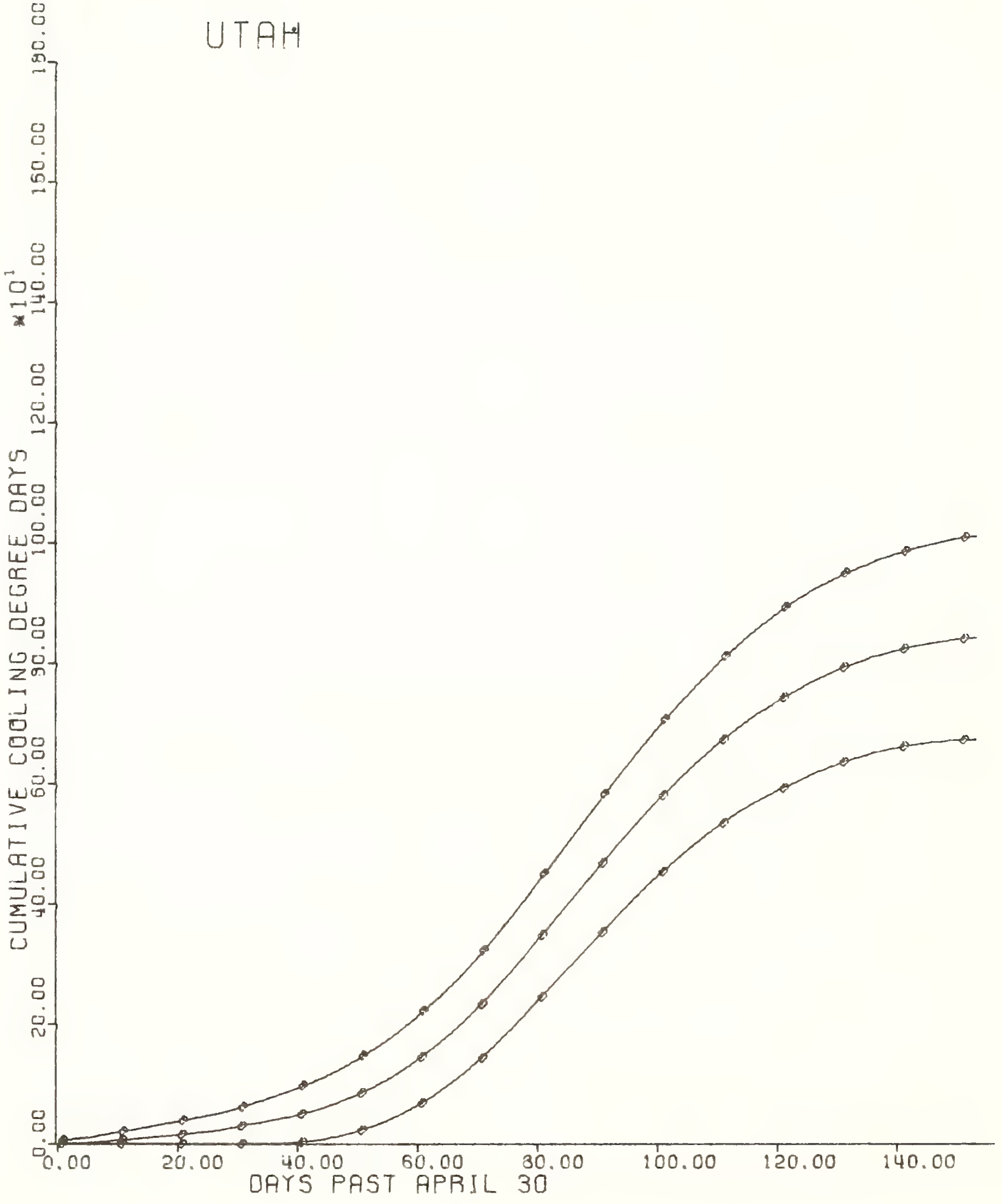
STATION	WEIGHT
SHREVEPORT, LA	.0641
ABILENE	.0236
AMARILLO	.0301
AUSTIN	.0549
BROWNSVILLE	.0301
CORPUS CHRISTI	.0316
DEL RIO	.0044
EL PASO	.0368
FORT WORTH	.2333
GALVESTON	.0284
HOUSTON	.1963
LUBBOCK	.0296
MIDLAND	.0269
PORT ARTHUR-BEAUMONT	.0371
SAN ANGELO	.0085
SAN ANTONIO	.1016
VICTORIA	.0166
WACO	.0259
WICHITA FALLS	.0182



UTAH
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	6	19	8
20	0	15	37	14
30	0	28	59	19
40	1	47	93	28
50	19	80	141	37
60	62	138	214	46
70	134	223	312	54
80	235	336	437	62
90	342	456	570	70
100	445	571	697	77
110	528	666	804	84
120	589	738	887	91
130	633	789	945	95
140	660	822	984	99
150	673	841	1009	102
153	674	843	1012	103

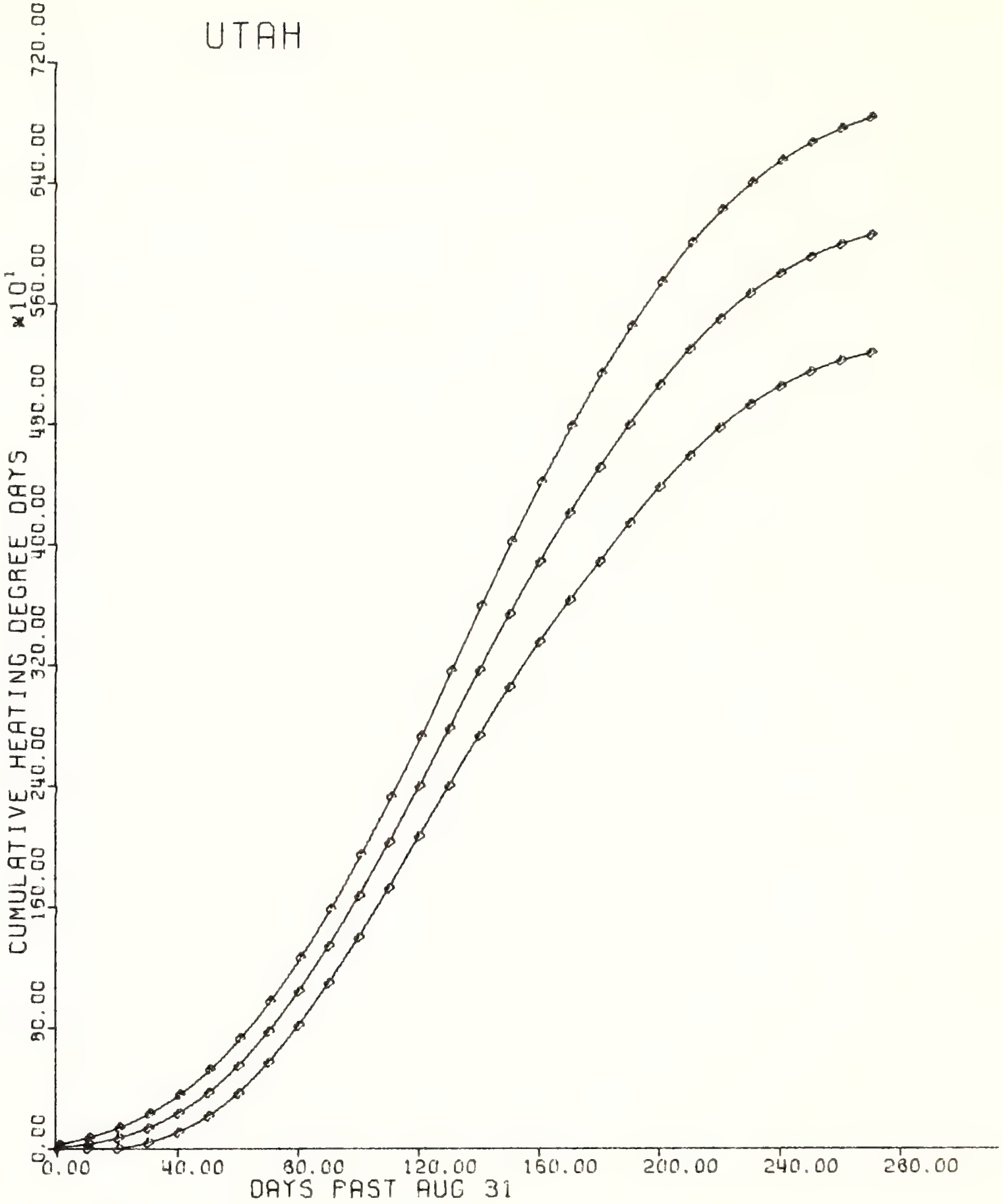
STATION	WEIGHT
ELY, NV	.0293
GRAND JUNCTION, CO	.0434
LAS VEGAS, NV	.0085
POCATELLO, ID	.1643
SALT LAKE CITY	.7545



UTAH
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	29	72	26
20	0	68	136	42
30	37	131	225	57
40	102	225	348	75
50	205	356	507	92
60	351	531	711	110
70	550	752	954	123
80	791	1014	1237	136
90	1069	1313	1557	149
100	1368	1640	1912	166
110	1693	1993	2293	183
120	2034	2363	2692	201
130	2370	2746	3122	229
140	2703	3130	3557	260
150	3026	3504	3982	292
160	3327	3854	4381	321
170	3605	4180	4755	350
180	3864	4486	5108	380
190	4122	4774	5426	398
200	4362	5041	5720	414
210	4574	5261	5988	431
220	4762	5485	6208	441
230	4919	5656	6393	449
240	5044	5795	6546	458
250	5143	5905	6667	464
260	5218	5990	6762	471
270	5273	6055	6837	477
273	5288	6072	6856	478

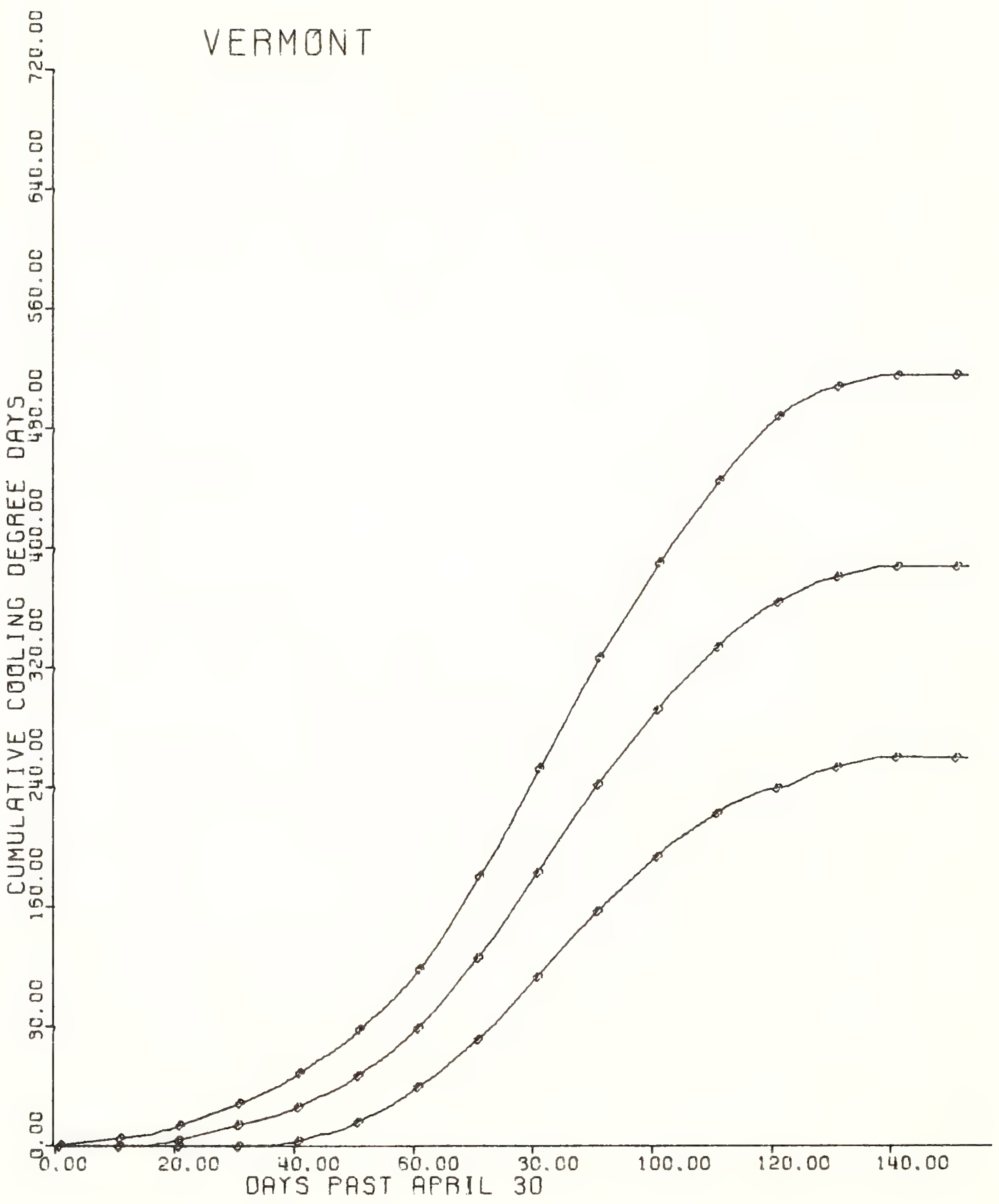
STATION	WEIGHT
ELY, NV	.0293
GRAND JUNCTION, CO	.0434
LAS VEGAS, NV	.0085
POCATELLO, ID	.1643
SALT LAKE CITY	.7545



VERMONT
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	5	3
20	0	3	12	6
30	0	13	27	9
40	2	24	46	13
50	14	44	74	18
60	36	75	114	24
70	68	121	174	32
80	109	177	245	42
90	153	236	319	51
100	190	287	384	59
110	220	330	440	67
120	239	362	485	75
130	253	380	507	78
140	260	388	516	78
150	260	388	516	78
153	260	388	516	78

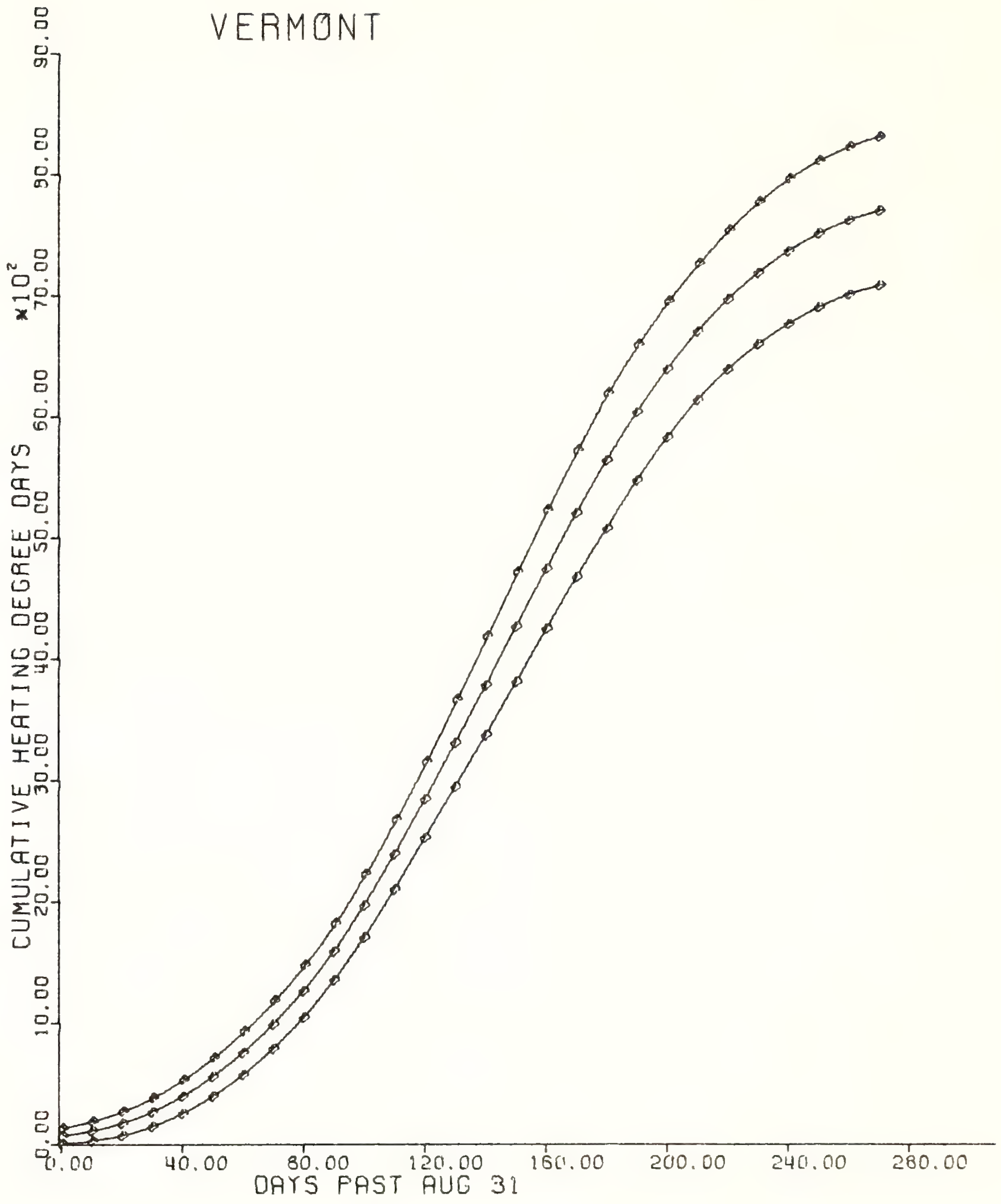
STATION	WEIGHT
CONCORD, NH	.1734
BURLINGTON	.8266



VERMONT
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	27	107	187	49
20	69	167	265	60
30	140	257	374	71
40	245	382	519	84
50	383	541	699	96
60	556	735	914	109
70	768	965	1162	120
80	1021	1236	1451	131
90	1323	1556	1789	142
100	1672	1931	2190	158
110	2064	2351	2638	175
120	2486	2800	3114	191
130	2909	3266	3623	217
140	3336	3740	4144	246
150	3772	4223	4674	275
160	4211	4700	5189	298
170	4640	5164	5688	320
180	5045	5604	6163	341
190	5445	6008	6571	343
200	5805	6369	6933	344
210	6120	6665	7250	344
220	6379	6954	7529	351
230	6590	7179	7768	359
240	6761	7363	7965	367
250	6903	7511	8119	371
260	7014	7625	8236	373
270	7091	7706	8321	375
273	7108	7724	8340	376

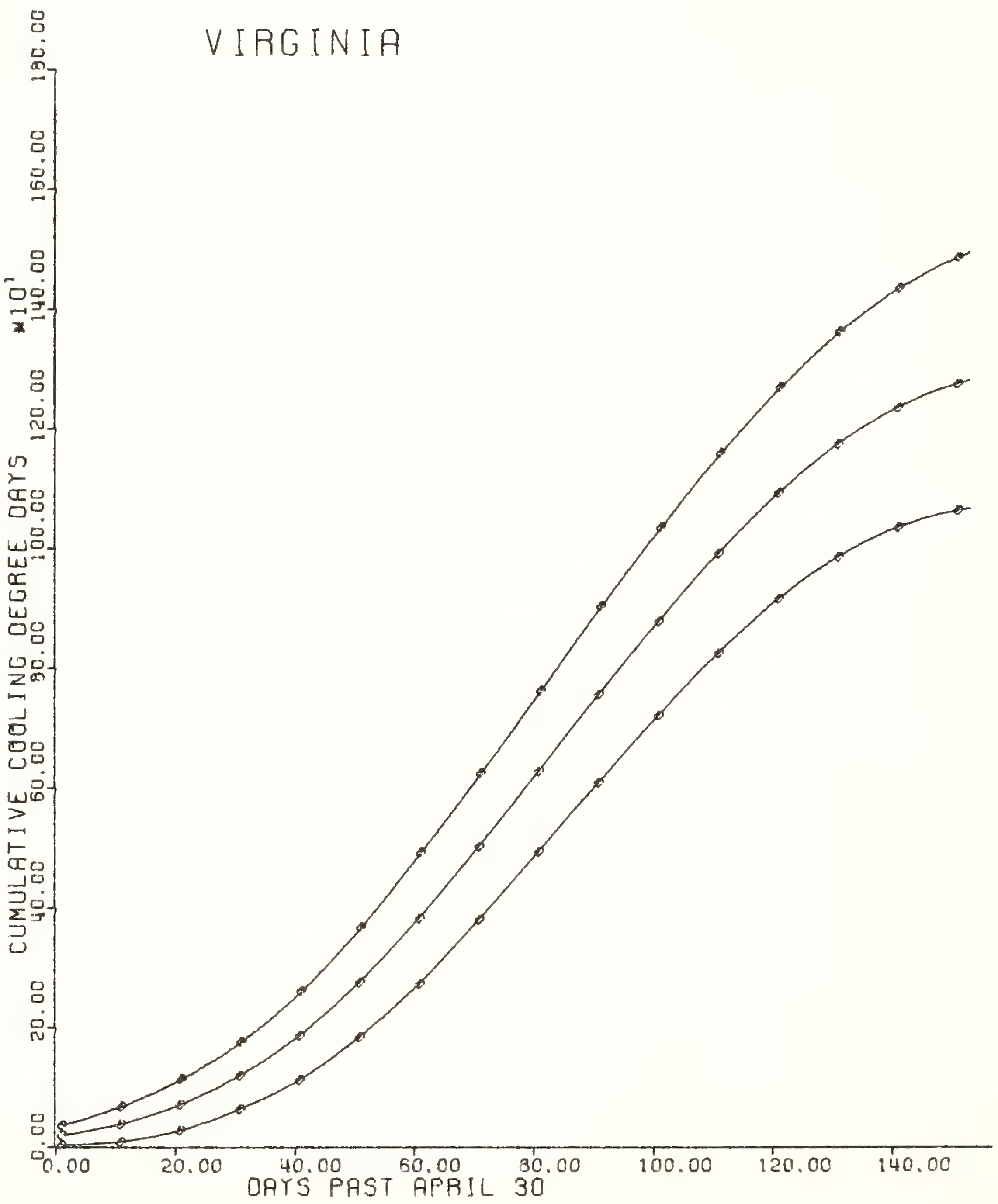
STATION	WEIGHT
CONCORD, NH	.1734
BURLINGTON	.8266



VIRGINIA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	7	36	65	17
20	25	67	109	26
30	59	114	169	34
40	107	179	251	44
50	176	266	356	55
60	264	372	480	66
70	370	491	612	74
80	483	616	749	81
90	598	744	890	89
100	711	867	1023	95
110	816	982	1148	101
120	909	1085	1261	107
130	982	1169	1356	114
140	1033	1232	1431	121
150	1063	1274	1485	129
153	1068	1283	1498	131

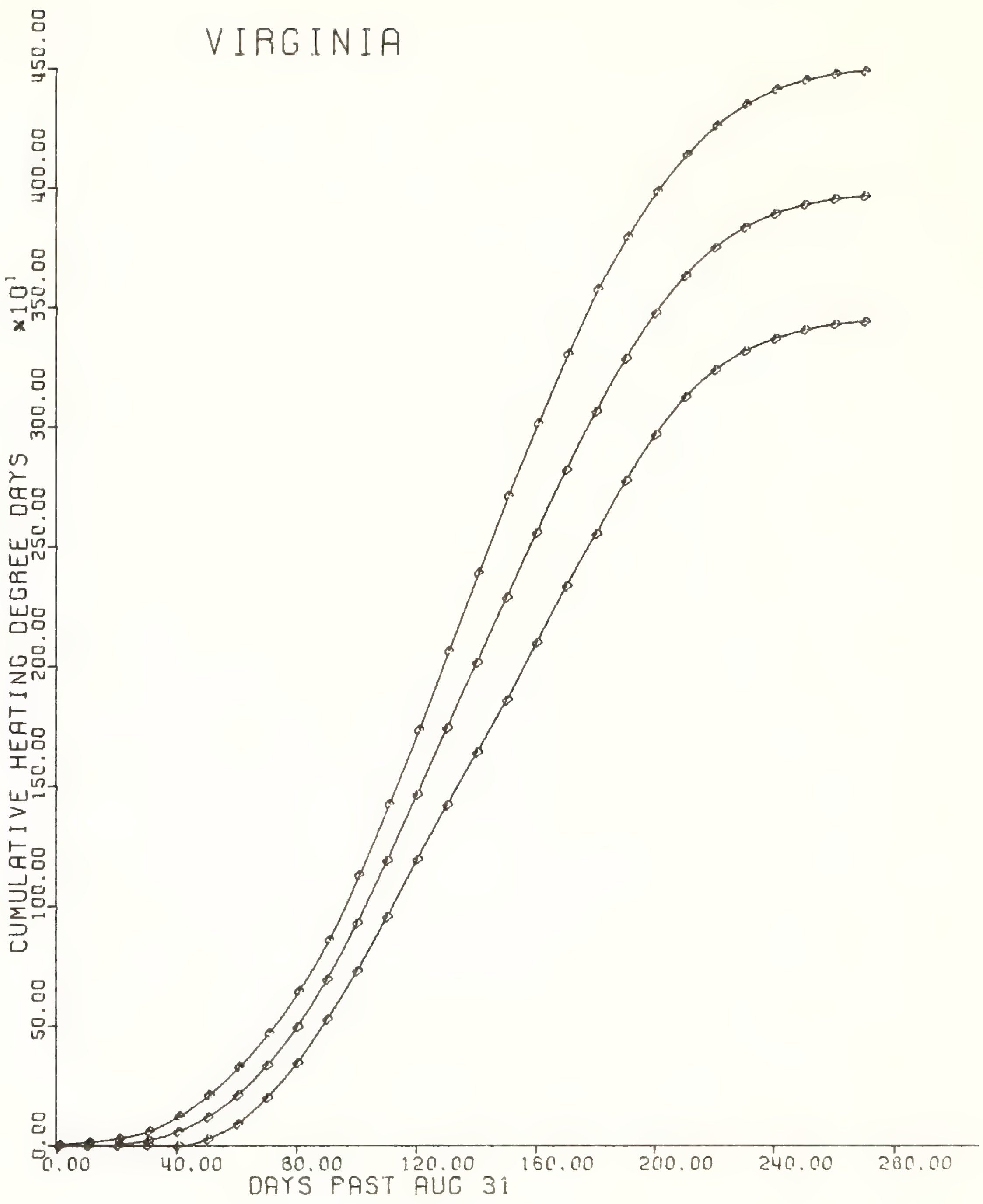
STATION	WEIGHT
LYNCHBURG	.1121
NORFOLK	.3001
RICHMOND	.1588
ROANOKE	.1913
WASHINGTON D.C.	.2377



VIRGINIA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	13	8
20	0	3	28	15
30	0	19	55	22
40	0	54	117	39
50	21	112	203	55
60	81	199	317	72
70	166	321	456	82
80	327	477	627	92
90	506	672	838	101
100	706	905	1104	121
110	932	1165	1398	142
120	1172	1439	1706	163
130	1400	1717	2034	193
140	1621	1991	2361	226
150	1839	2262	2685	258
160	2075	2533	2991	279
170	2313	2797	3281	295
180	2534	3045	3556	312
190	2756	3268	3760	312
200	2953	3463	3973	311
210	3114	3622	4130	310
220	3232	3744	4256	312
230	3313	3831	4349	316
240	3367	3890	4413	319
250	3407	3931	4455	320
260	3431	3956	4481	320
270	3444	3970	4496	321
273	3446	3972	4498	321

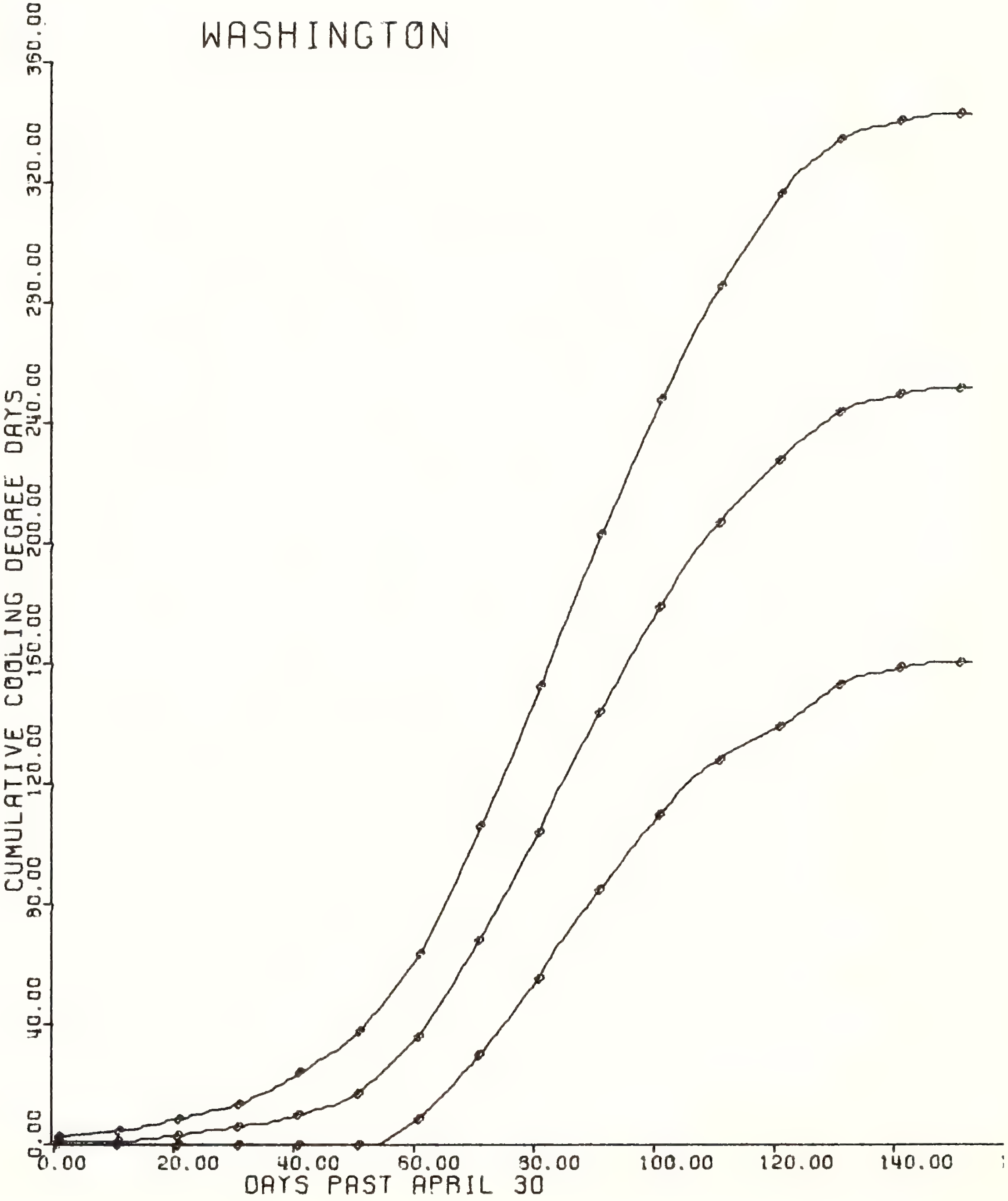
STATION	WEIGHT
LYNCHBURG	.1121
NORFOLK	.3001
RICHMOND	.1588
ROANOKE	.1913
WASHINGTON D.C.	.2377



WASHINGTON
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	1	4	2
20	0	3	8	3
30	0	6	13	4
40	0	9	22	8
50	0	16	36	12
60	7	34	61	16
70	27	64	101	23
80	52	100	148	29
90	82	140	198	35
100	107	175	243	42
110	127	205	283	47
120	138	226	314	53
130	152	243	334	55
140	158	249	340	55
150	161	252	343	56
153	161	252	343	56

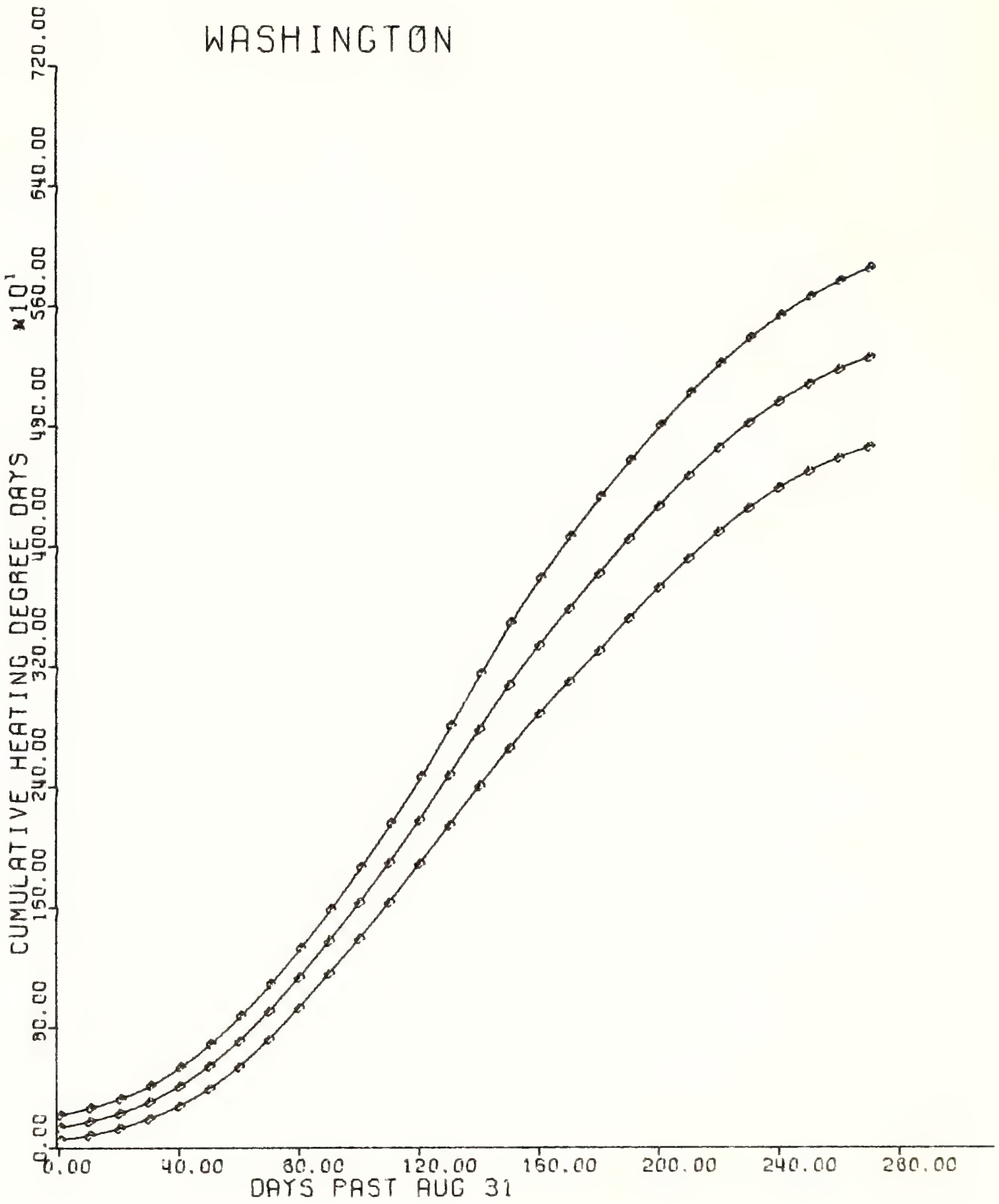
STATION	WEIGHT
LEWISTON, ID	.0402
QUILLAYUTE	.0261
SEATTLE TACOMA	.6755
SPOKANE	.0862
WALLA WALLA	.0595
YAKIMA	.1125


WASHINGTON

WASHINGTON
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	81	171	261	55
20	124	223	322	60
30	189	297	405	66
40	271	399	527	78
50	382	530	678	90
60	524	693	862	103
70	704	888	1072	112
80	911	1110	1309	121
90	1137	1351	1565	130
100	1368	1606	1844	145
110	1609	1872	2135	160
120	1867	2155	2443	176
130	2125	2452	2779	200
140	2385	2755	3125	226
150	2635	3049	3463	252
160	2870	3319	3768	274
170	3084	3564	4044	293
180	3287	3799	4311	312
190	3505	4031	4557	321
200	3711	4250	4789	329
210	3906	4458	5010	337
220	4086	4646	5206	342
230	4244	4812	5380	346
240	4382	4957	5532	351
250	4496	5078	5660	355
260	4588	5177	5766	359
270	4662	5258	5854	363
273	4682	5260	5878	364

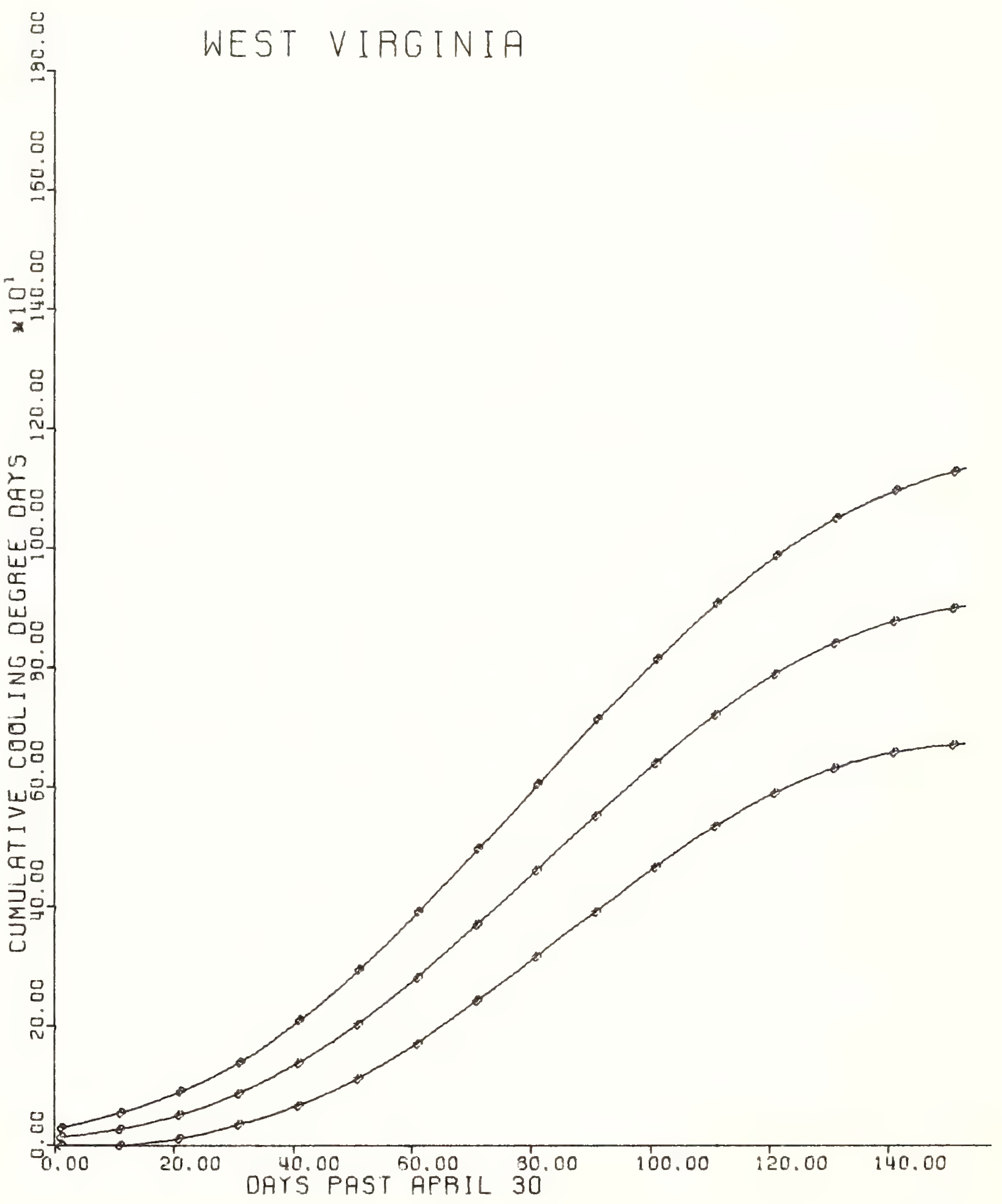
STATION	WEIGHT
LEWISTON, ID	.0402
QUILLAYUTE	.0261
SEATTLE TACOMA	.6755
SPOKANE	.0862
WALLA WALLA	.0595
YAKIMA	.1125



WEST VIRGINIA
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	26	52	16
20	10	48	86	23
30	32	83	134	31
40	63	133	203	42
50	107	196	285	54
60	164	273	382	66
70	235	361	487	77
80	308	451	594	87
90	384	544	704	97
100	459	632	805	106
110	529	714	899	113
120	586	784	982	121
130	630	838	1046	127
140	658	876	1094	133
150	671	899	1127	139
153	674	905	1136	141

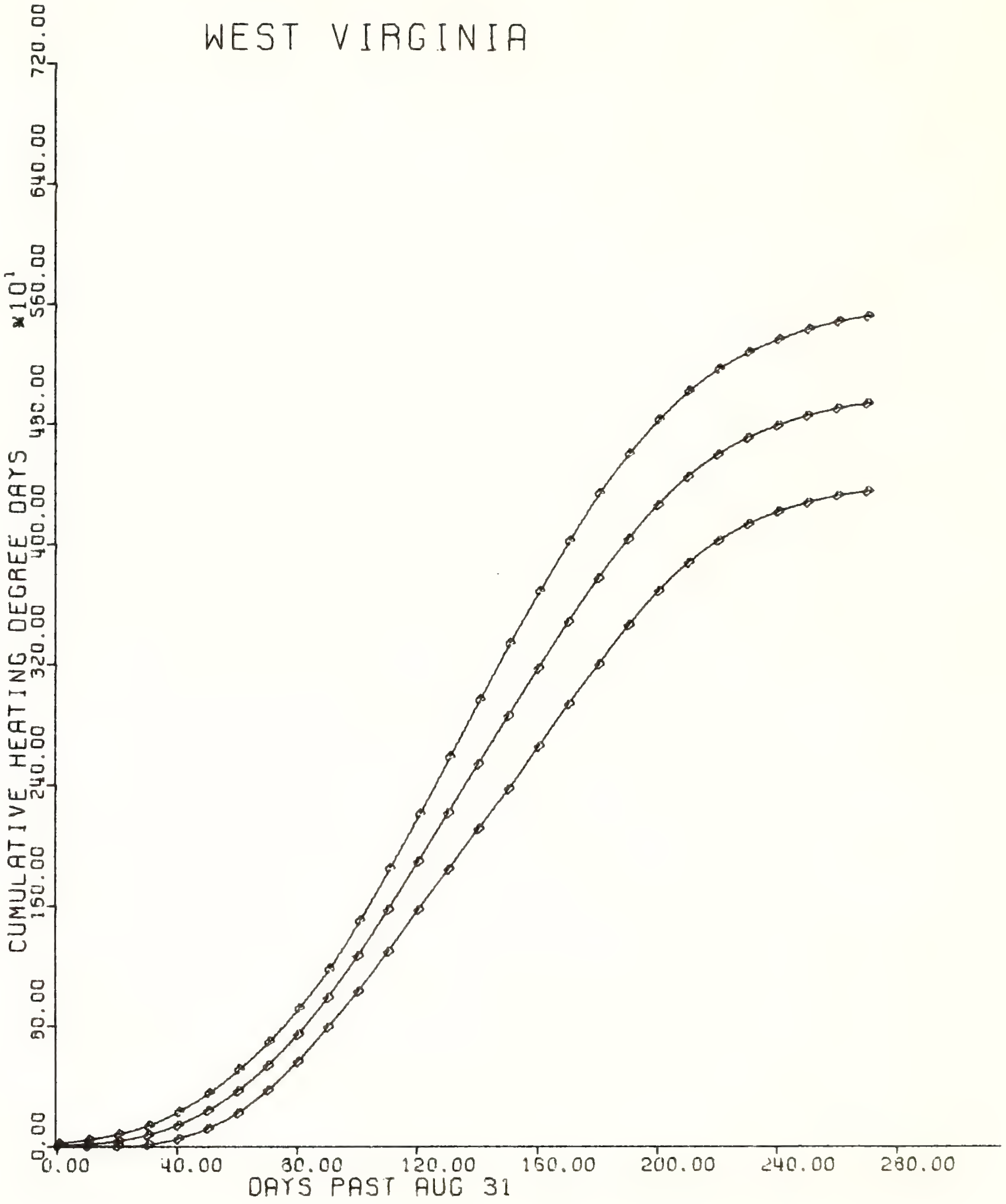
STATION	WEIGHT
HARRISBURG, PA	.0682
BECKLEY	.2437
CHARLESTON	.2311
HUNTINGTON	.1089
PARKERSBURG	.3481



WEST VIRGINIA
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	14	42	17
20	0	33	78	27
30	8	70	132	38
40	44	133	222	55
50	109	226	343	71
60	207	352	497	88
70	355	517	679	99
80	541	720	899	109
90	767	962	1157	119
100	1006	1240	1474	143
110	1269	1544	1819	168
120	1547	1864	2181	193
130	1819	2188	2557	225
140	2088	2512	2936	259
150	2351	2830	3309	292
160	2633	3147	3661	314
170	2914	3456	3998	330
180	3179	3748	4317	347
190	3441	4013	4585	349
200	3672	4245	4818	349
210	3865	4438	5011	350
220	4016	4590	5164	350
230	4130	4705	5280	351
240	4215	4791	5367	351
250	4280	4858	5436	352
260	4328	4909	5490	354
270	4359	4942	5525	356
273	4366	4950	5534	356

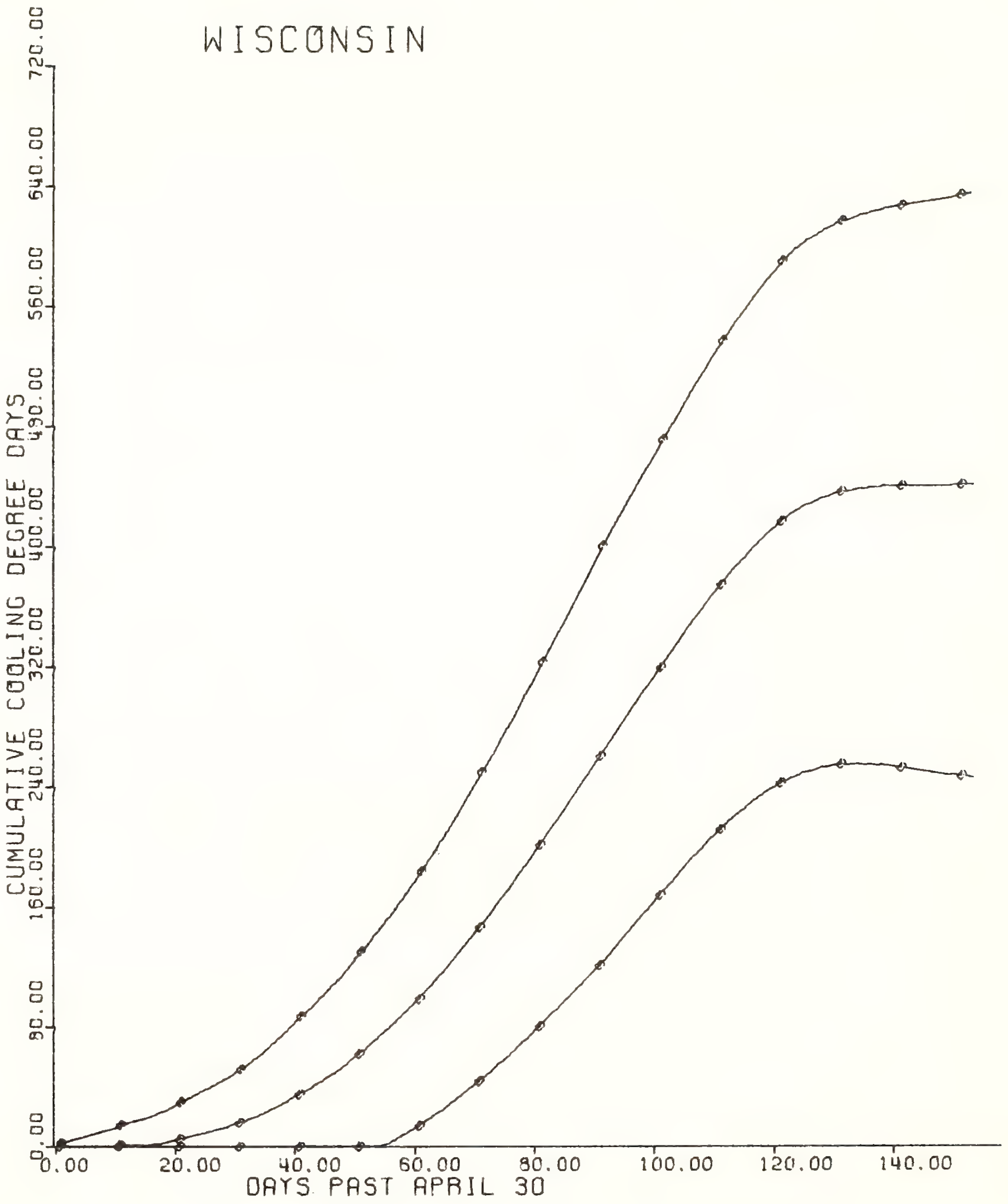
STATION	WEIGHT
HARRISBURG, PA	.0682
BECKLEY	.2437
CHARLESTON	.2311
HUNTINGTON	.1089
PARKERSBURG	.3481



WISCONSIN
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	12	8
20	0	4	27	14
30	0	15	50	21
40	0	33	84	31
50	0	59	126	41
60	11	95	179	51
70	40	142	244	62
80	76	196	316	73
90	117	255	393	84
100	164	314	464	92
110	208	370	532	99
120	240	413	586	105
130	255	436	617	110
140	254	441	628	114
150	249	442	635	118
153	247	442	637	119

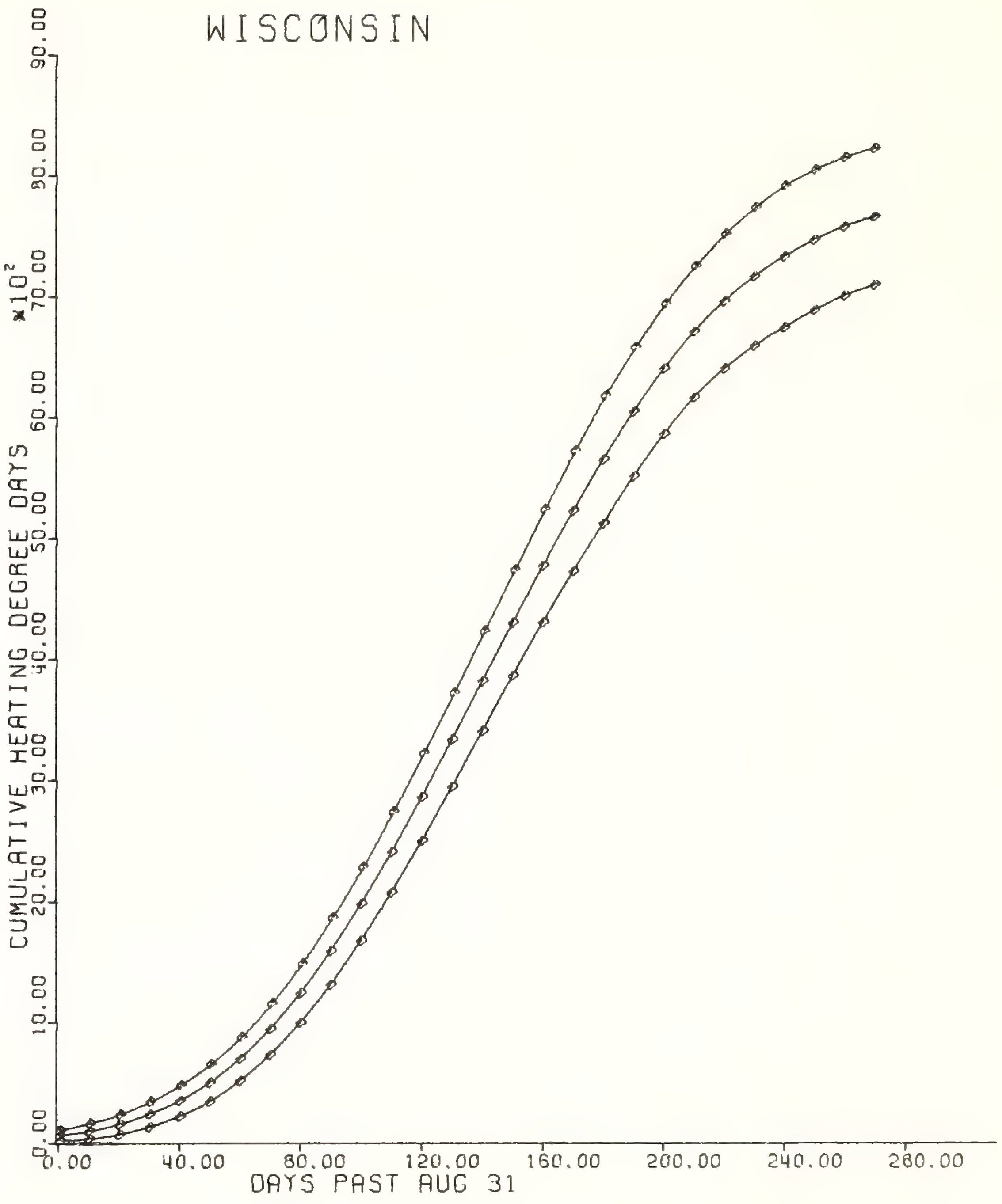
STATION	WEIGHT
HOUGHTON LAKE, MI	.0546
DULUTH, MN	.0471
GREENBAY	.1957
LA CROSSEE	.1241
MADISON	.1809
MILWAUKEE	.3976



WISCONSIN
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	36	98	160	38
20	70	152	234	50
30	131	233	335	62
40	213	341	469	78
50	334	487	640	94
60	499	678	857	109
70	710	921	1132	129
80	972	1216	1460	149
90	1284	1561	1838	169
100	1645	1950	2255	186
110	2042	2375	2708	203
120	2468	2828	3188	220
130	2914	3300	3686	235
140	3371	3782	4193	251
150	3827	4263	4699	266
160	4270	4735	5200	284
170	4694	5190	5686	303
180	5092	5620	6148	322
190	5484	6019	6554	326
200	5838	6379	6920	330
210	6145	6691	7237	333
220	6390	6949	7508	341
230	6586	7159	7732	350
240	6742	7330	7918	359
250	6888	7472	8056	356
260	7010	7586	8162	351
270	7103	7671	8239	346
273	7125	7690	8255	345

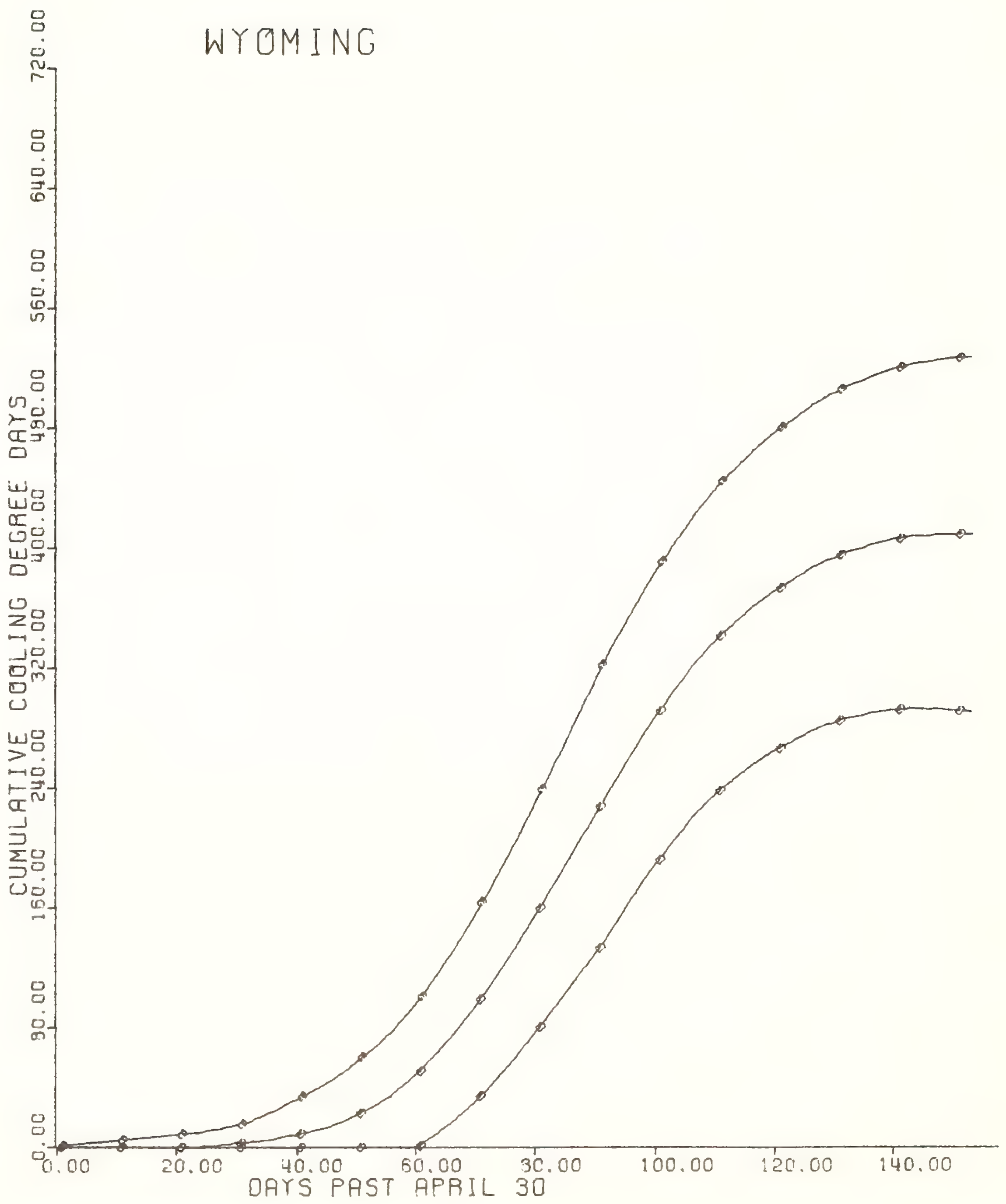
STATION	WEIGHT
HOUGHTON LAKE, MI	.0546
DULUTH, MN	.0471
GREENBAY	.1957
LA CROSSEE	.1241
MADISON	.1809
MILWAUKEE	.3976



WYOMING
NORMAL ACCUMULATED COOLING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: MAY - SEPTEMBER

DAYS PAST APRIL 30	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	0	0	5	3
20	0	0	8	5
30	0	3	15	7
40	0	8	32	14
50	0	21	57	22
60	0	48	97	30
70	30	93	156	39
80	76	154	232	48
90	128	221	314	57
100	188	287	386	60
110	235	338	441	63
120	265	372	479	65
130	284	394	504	67
140	293	407	521	70
150	292	410	528	72
153	291	410	529	72

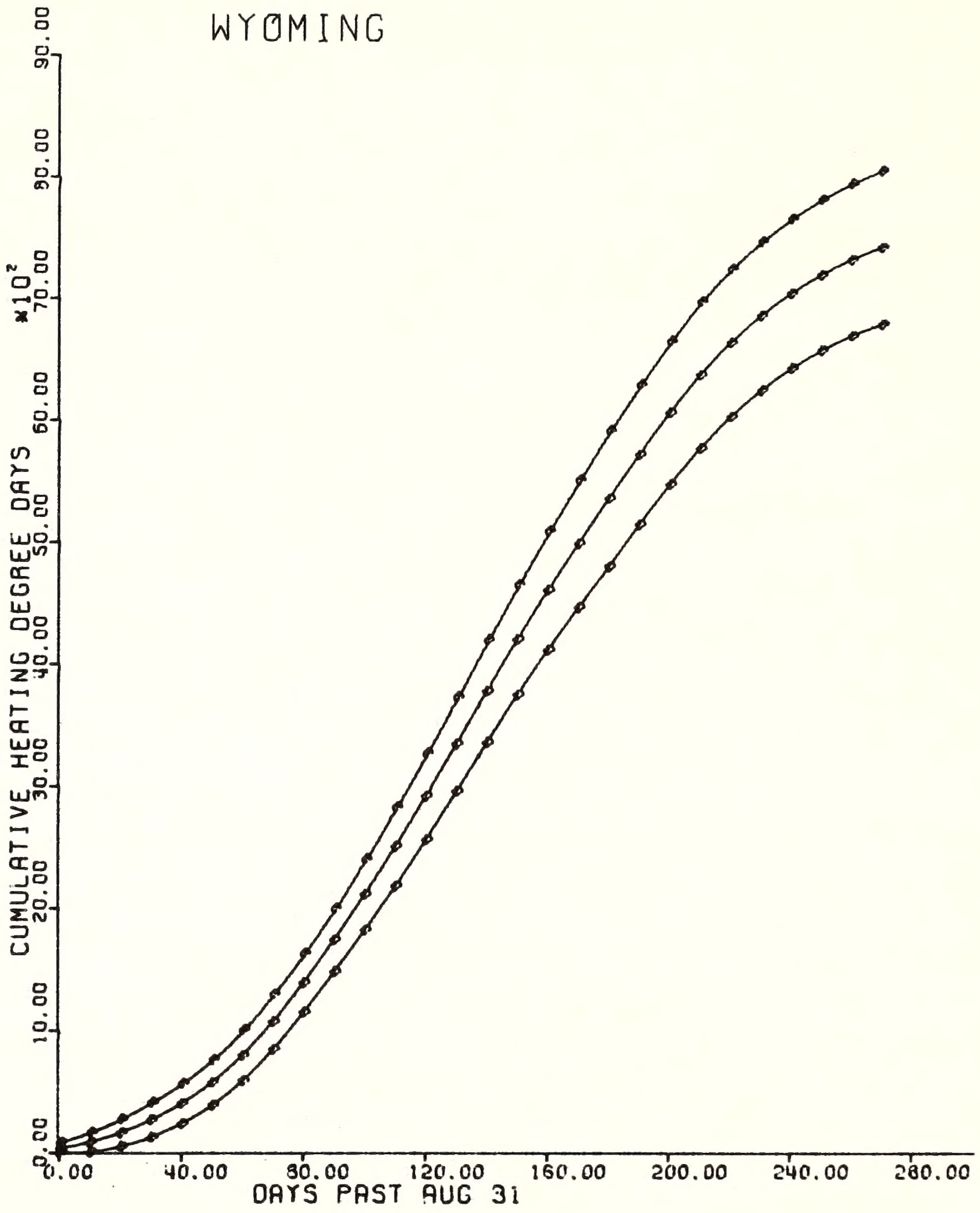
STATION	WEIGHT
RAPID CITY, SD	.0693
CASPER	.1928
CHEYENNE	.2380
LANDER	.3854
SHERIDAN	.1145



WYOMING
NORMAL ACCUMULATED HEATING DEGREE DAYS
AND 90% CONFIDENCE INTERVAL
STATIONS WEIGHTED BY POPULATION - BASE 65 F
SEASON: SEPTEMBER - MAY

DAYS PAST AUG 31	LOWER BOUND	NORMAL	UPPER BOUND	ST.DEV.
10	5	84	163	48
20	49	159	269	67
30	122	262	402	85
40	231	393	555	99
50	378	562	746	112
60	572	778	984	126
70	824	1048	1272	137
80	1122	1364	1606	147
90	1455	1714	1973	158
100	1798	2087	2376	176
110	2158	2478	2798	195
120	2535	2887	3239	214
130	2930	3314	3698	234
140	3330	3746	4162	254
150	3722	4171	4620	274
160	4092	4576	5060	295
170	4441	4961	5481	317
180	4777	5333	5889	339
190	5123	5695	6267	349
200	5454	6041	6628	358
210	5754	6356	6958	367
220	6018	6626	7234	370
230	6240	6851	7462	372
240	6426	7040	7654	374
250	6578	7197	7816	378
260	6701	7326	7951	381
270	6797	7428	8059	384
273	6822	7454	8086	386

STATION	WEIGHT
RAPID CITY, SD	.0693
CASPER	.1928
CHEYENNE	.2380
LANDER	.3854
SHERIDAN	.1145



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